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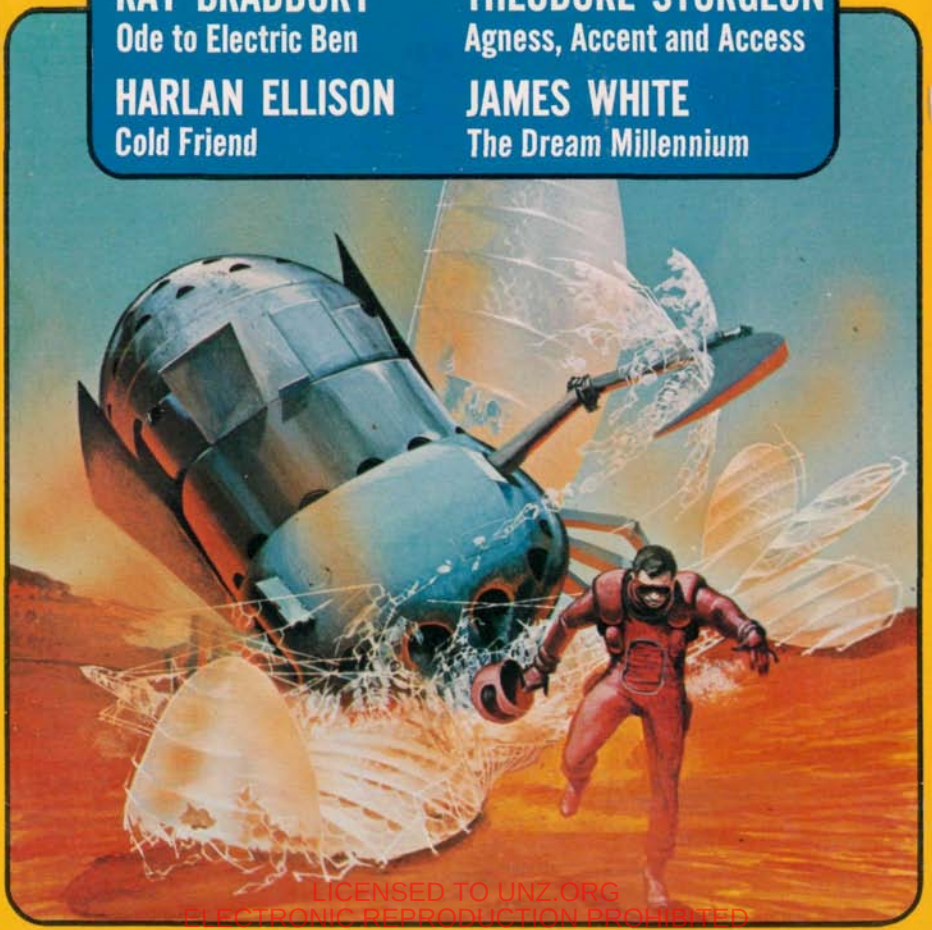

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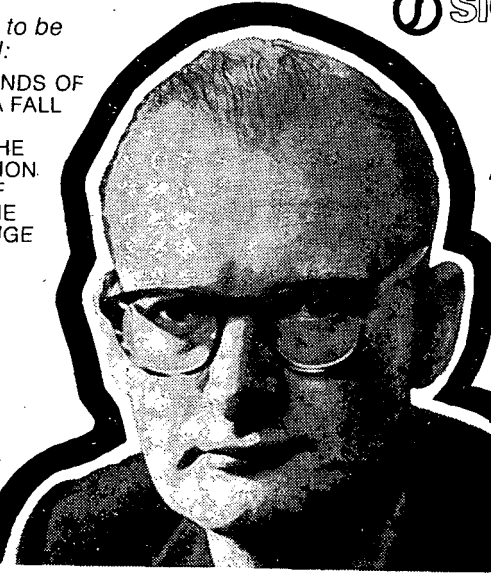

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ALL STORIES NEW
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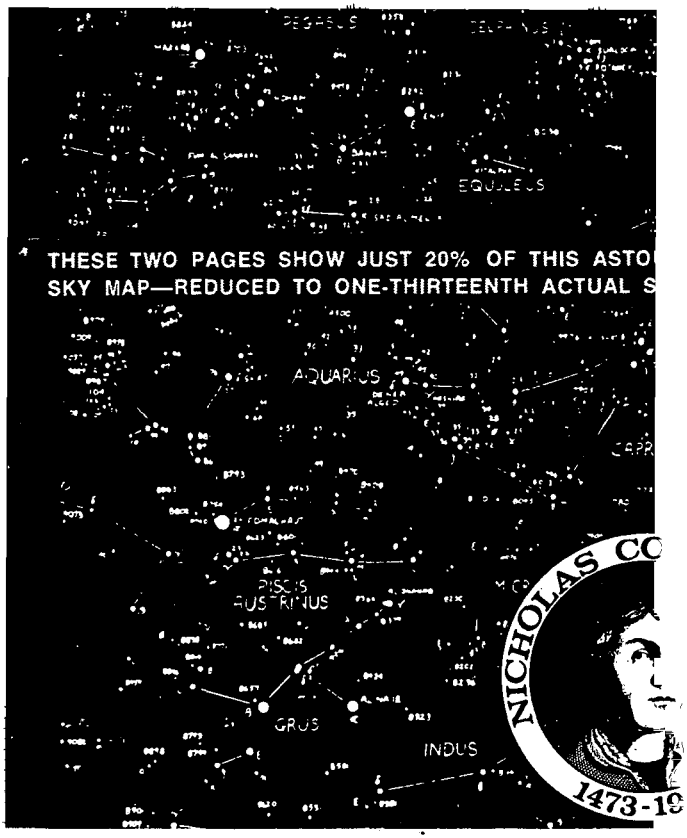

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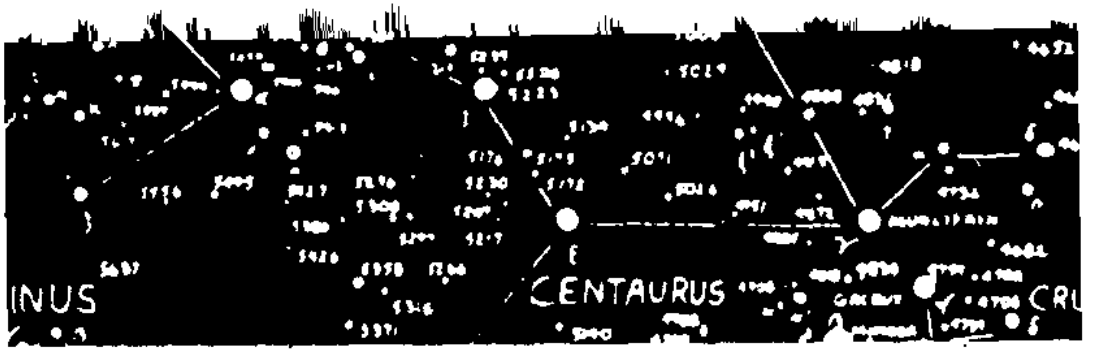

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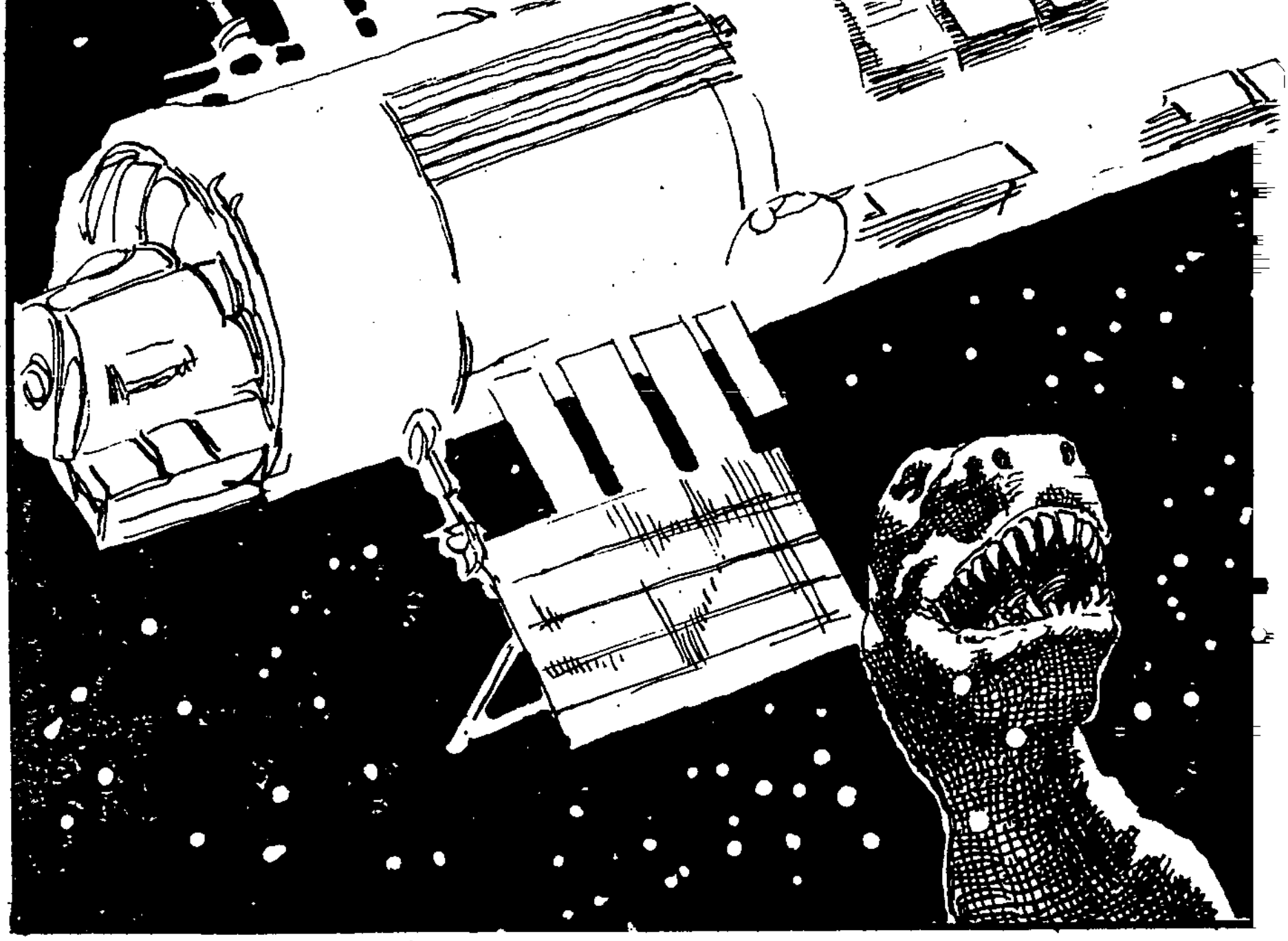

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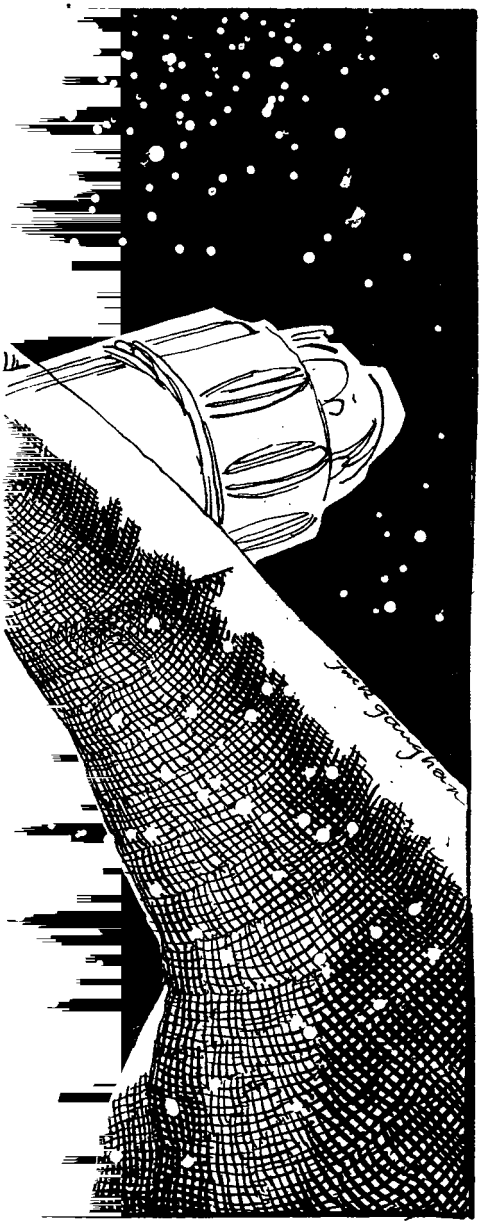

PART ONE

The brave had made Earth unlivable. It remained for the meek to inherit the stars!

THE DREAM MILLENNIUM

JAMES WHITE

I

HIS awakening was like walking out of a warm room and into a snowstorm. The dream, what little he could remember of it, had not been entirely pleasant but it had been warm. He tried desperately to hold onto it, to pull it back and around him again like a warm blanket that was slipping off his bed, to do anything that would hold back this awful heartstopping cold.

But his mind was working, which meant that his blood was carrying sugar and oxygen to his thawing brain, and his circulatory systems had been successfully restarted or he would not have been able to feel the cold in the first place. So he waited patiently while the dream warmth faded, to be replaced by the real thing—then he opened his eyes.

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In the unlighted cubicle the bright letters on the ceiling display seemed to float in the darkness above his head.

GOOD MORNING DEVLIN. THIS IS A FIRST AWAKENING SYSTEMS CHECK WHICH WILL NOT BE REPEATED DURING SUBSEQUENT AWAKENINGS.

PLEASE INDICATE YOUR COMPLETE RETURN TO CONSCIOUSNESS, VISUAL ACUITY AND MUSCLE CONTROL BY DEPRESSING THE CENTER BUTTON OF THE THREE THAT ARE CONVENIENT TO YOUR RIGHT HAND.

Devlin pressed hard on the indicated button—which did not move. His heart, which was the loudest thing in the utterly silent ship, became even noisier.

Had the moisture in his breath penetrated the mechanism, he wondered, freezing and jamming it with ice? Were the delicate actuators frozen solid by the years of hyperthermia which had held his body? In short, had the complex life-support system of the starship, which represented the pinnacle of Earth's scientific achievements in virtually every field of knowledge, already developed a malfunction?

He pressed again, much harder.

REPEAT, THIS IS A FIRST AWAKENING SYSTEMS CHECK. WHEN READY TO ASSIMILATE INFORMATION, DEPRESS THE BUTTON ON THE RIGHT.

Devlin reminded himself that he had not used his hand for a very long time and the digits, like the rest of his newly warmed body, were weak and stiff. Also, the buttons would have been designed to operate with a firm pressure to avoid accidental activation. The moment of calm and logical thinking had an immediate effect on his elevated pulse rate and this time the indicated button went in at the first attempt.

SHIP STATUS. SEVENTY-FIVE YEARS INTO MISSION. ALL SYSTEMS FUNCTIONING.

The words hung in the darkness for the length of time needed for him to read them very slowly—then they were replaced.

SHIP PERSONNEL CURRENTLY AWAKE—ONE. IDENTIFY JOHN DEVLIN. REASONS FOR AWAKENING. TO CHECK FUNCTIONING OF SHIP LIFE-SUPPORT, REVIVICATION AND COMMUNICATIONS INTERNAL SYSTEMS. TO CHECK FUNCTIONING OF DEVLIN VOLUNTARY/INVOLUNTARY MUSCLES, CIRCULATION, SENSORIUM, SPEECH ORGAN AND MEMORY. PERIOD OF AWAKENING—ONE HOUR.

FOR INSTRUCTIONS DEPRESS BUTTON ON THE LEFT.

Devlin pressed the button on the left.

BASIC INSTRUCTIONS. SPEAK, EXERCISE, REMEMBER.

THERE was no sane reason why he should not say something out loud, or make some sort of modulated noise like a hum or a whistle, perhaps. But he could not do any of those things. The thought of the vast, utterly silent ship stretching away on all sides of his cubicle, guarded and guided by completely silent computers, was paralyzing his own ability to make sounds with an overwhelming spell based on the laws of sympathetic magic.

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ADDITIONAL INFORMATION TO INSTRUCTION SPEAK. THIS PROCESS INVOLVES NOT ONLY CONTROL AND COORDINATION OF MUSCLES CONTROLLING THE LUNGS, THROAT AND TONGUE–IT IS A BASIC EXERCISE IN THE REACTIVATION, ORGANIZATION AND RECALL OF MEMORY DATA.

SOUNDS PRODUCED FOR THIS EXERCISE ARE FOR TEST PURPOSES ONLY AND WILL NOT BE ADDED FOR EVALUATION TO THE PSYCH PROFILE.

"I don't believe you," said Devlin.

Satisfied, the display replied:

EXERCISE.

"Yes, master," said Devlin, beginning to sit up. His head rose perhaps six inches from its padded rest before he collapsed back. By the time his grayed-out vision had returned to normal there was a new message hanging above him.

ADDITIONAL INFORMATION TO INSTRUCTION EXERCISE. INITIAL MOVEMENTS SHOULD BE SLOW AND GENTLE. SUGGEST BRIEF EXERCISE OF LEGS, ARMS AND NECK MUSCLES WHILE IN RECUMBENT POSITION FOLLOWED BY ROLL ONTO LEFT SIDE. FIRM PRESSURE FROM HANDS AND/OR KNEES WILL CAUSE CASKET WALL TO FOLD DOWN ALLOWING CHANGE TO SITTING POSITION.

MOVEMENT IS ALLOWED WITHIN THE COMPARTMENT AND UNOBSTRUCTED SECTION OF CORRIDOR OUTSIDE. FOR THIS TEST NO SOLID OR LIQUID FOOD WILL BE CONSUMED SINCE THE ONE-HOUR WAKING PERIOD DOES NOT ALLOW SUFFICIENT TIME FOR WASTES TO BE ELIMINATED BEFORE COOLING.

The display blanked out for a few minutes, then lit with another message.

ADDITIONAL BASIC INFORMATION. THIS COMPUTER POSSESSES NO HUMAN ATTRIBUTES. IT WAS PROGRAMED BY HUMAN BEINGS WHO ATTEMPTED TO PROVIDE FOR ALL FORESEEABLE CONTINGENCIES, BUT IT IS NOT HUMAN. IT WILL NOT BE IMPRESSED BY ANY ATTEMPT TO DISPLAY UNUSUALLY HIGH DEGREE OF PHYSICAL FITNESS BY HURRYING THE EXERCISES, NOR WILL IT FEEL SYMPATHY IF DEVLIN BREAKS A LEG WHILE DOING SO.

"Now," said Devlin, laughing, "I believe you."

REMEMBER.

"All *right!*"

ADDITIONAL TO INSTRUCTION REMEMBER. THIS EXERCISE TO PROCEED IN CONJUNCTION WITH INSTRUCTIONS SPEAK AND EXERCISE. DURING THIS TEST A DETAILED SEARCH OF THE DEVLIN MEMORY STORE IS UNNECESSARY. SIMPLY CHECK THAT THERE ARE NO OBVIOUS GAPS IN THE MEMORY CHAIN AND CONCENTRATE ON MEMORIES ASSOCIATED WITH THE PRESENT ENVIRONMENT AND RESERVE TIME FOR RECALL OF AS MUCH AS POSSIBLE OF THE COLD-SLEEP DREAM SEQUENCES.

RETURN TO CASKET FOR REPROCESSING IN 53 MINUTES.

The display rolled away from him as he carefully opened the side wall of his casket and swung his feet to the deck and into the exercise stirrups, but there was another display facing him as he sat up.

SPEAK. EXERCISE. REMEMBER.

The words dimmed slightly as the cubicle lighting came on.

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"I'm not really hungry," Devlin lied as his eyes went to the food dispenser. He had been required to fast for twelve hours before the pre-flight cooldown and, in a manner of speaking, he had had nothing to eat for seventy-five years. At the same time his body, although stiff and weak, still looked healthy and well-nourished, and the really severe pangs of hunger had begun only when the display had informed him that he was not to eat.

"Psychosomatic malnutrition," he said drily, "is a terrible way to die."

BUT he was not even considering using the dispenser. There were sound medical reasons for not undergoing hibernation anesthesia on a full stomach and hunger had been a common enough condition on Earth. His present hunger, like the rest of his body, had been frozen and preserved for more than seventy years and the process could be repeated indefinitely. The truth was that he felt fine.

All at once his hunger receded, driven back by a feeling composed equally of wonder and sheer relief. Seventy-five years of ship-elapsed time had passed and he was alive and well, while back on Earth everyone he had known was long since dead. He shied away from remembering some of them and tried to think instead about the starship, its inconceivable velocity, which was the end result of decades of gentle acceleration, and the polluted and over-populated planet it had left behind.

EXERCISE. REMEMBER.

There was a narrow area of clear deck on the open side of the casket. The rest of the space in the cubicle—that not occupied by the food dispenser and the ceiling and wall displays—was stuffed with equipment associated with the cold sleep systems and sensors. One of the few tests that had qualified him for joining the mission had been to check for any tendency toward claustrophobia, Devlin remember, and another had been a test for the degree of dissatisfaction with present—or rather seventy years' past—surroundings.

While he exercised in the narrow space Devlin wondered how he was supposed to know if there were an obvious gap in his memory. If he could not remember something important, how was he supposed to know that he had forgotten it?

REMEMBER.

From both displays in unison.

Obviously the computer knew when he had obeyed the instructions to speak and exercise, but it could not tell whether or not he was remembering properly. Telepathic computers were beyond even the resources of Earth science, so the chances were that it would simply keep reminding him and hoping for the best.

Gradually his stiffness left him and he drifted into the corridor. The lighting was switched on but not the heating—Devlin's breath hung like an intermittent fog around his face and he had to pull himself rapidly around the wall nets to keep warm. But there was nothing strange to him—no obvious gaps in his memory—about this short corridor in the crew segment of the ship. It was just like the corridor in the simulator back on

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Earth, except that there the feeling of weightlessness had been produced by a system of spring wires and localized sensory deprivation drugs.

If he had been chosen to occupy one of the four colonist segments built around the central crew and computer module, there would have been much less room in which to exercise—the others were confined to their cubicles for the duration of the trip.

Feeling warmer, but short of breath, he stopped for a moment with his fingers around a strand of netting. As he was about to move off again he saw the other figure, ghost-like, its head surrounded by the same self-generated fog and wearing an open-mesh cold suit identical to the one he was wearing himself. The figure was standing only a few feet away. He reached forward instinctively and discovered that it was his reflection an instant before his hand touched the transparent plastic door and two messages, one of them upside down with respect to the other, appeared on it.

ACCESS TO CENTRAL CONTROL. NO TO BE OPENED WITHOUT COMPUTER PERMISSION EXCEPT IN CASES OF EXTREME EMERGENCY.

Devlin shivered suddenly and decided that he had had enough exercise. He moved back to his cubicle, trying unsuccessfully not to read the name tag on the door opposite his own.

For a few seconds he stared at the manual override handle, which grew from the gray metal like a bright red banana. In an emergency he could bypass the computer controls and initiate the awakening of any person

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ture of the same name. Herbert's inspirational text accompanying the photographs makes this a book you will want to own.

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On the drawing board we have THE BEST OF HENRY KUTTNER, a definitive collection. And there will be other BESTS to follow: Pohl and Leiber, for two.

●●●

More to come on these books as their publication dates draw near. Next month we have new books by Poul Anderson and Robert Silverberg.

Stay tuned . . . BB

in the ship. He was not, however, supposed to warm up one of the females just because he felt cold and lonely. He shivered again and sought the warmth of his own cubicle.

But the heaters had been turned off in preparation for his imminent cooldown and his jaws began to ache with the effort of not allowing his teeth to chatter.

REPROCESSING IN SEVEN MINUTES.

Devlin lay down and the hinged flaps swung up and clicked into position. It was the first noise not made by himself that he had heard since the awakening.

REMEMBER. IMPERATIVE YOU CONCENTRATE ON MEMORIES OF COLD SLEEP DREAM SEQUENCES FOR REMAINDER OF CONSCIOUS PERIOD.

Devlin had been told often enough how important it was that he remember as much as possible of the dreams experienced during cold sleep—the dreams that spelled out the difference between a dead and frigid mind and body and a mind/body that has suspended life, identity and continuity. But he was not supposed to remember the reasons now—there was no time. If he were to be sure of another coherent awakening he had to concentrate on his last dream.

The display was hazy with breath fog as he closed his eyes. He tried to ignore the goose pimples that crawled like frozen insects all over his body and the picture of Brother Howard that kept getting between him and his dream. He had been warm. He had floated in a thick, warm soup where existence was in-

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credibly violent. Pain, pleasure, hunger, repletion, sex—all had been experienced in such raw, savage concentrations that he could not now tell which had been painful and which pleasant. All his senses had been affected as if by an abrasive rubbed along a bared nerve. And he had been blind.

As more and more of the dream came back to him he began to realize that the only thing nice about it had been its warmth.

A small change in the quality of the light on the other side of his closed eyelids made him open his eyes. The display had a final message.

GOOD NIGHT DEVLIN.

Around and within his body there was a sharp, silent explosion of cold.

II

Hunger was making him take risks. He had lived long and grown large by not taking unnecessary risks, but with increasing size had come a proportionate growth in his hunger and in the number of risks taken to assuage it. On this occasion his hunger was intense and the risks acceptable.

He moved from beneath the cover of a clump of gently waving algae, skirting the overhanging curve of a massive Tabulata and crawled onto the bright area of sea bottom that stretched ahead for as far as his rudimentary eyes could see.

The area was clear of rocks and major growths, but it was not empty. In the middle distance lay the enormous, garishly patterned shell of a carnivorous cephalopod, the pointed rear of its narrow conical body clearly visible while the forward section was hidden by a self-generated fog of disturbed mud that concealed its head, tentacles and wildly struggling victim. Nearby lay a small group of brachipods, looking disdainful behind the protection of their smooth white shells. The remainder of the area was, as usual, covered by the tiny scurrying shapes of small trilobites scavenging for the plant and animal debris that littered the sand.

He joined them.

But the tiny morsels of organic material did nothing to quell the hunger that raged along every nerve in his body—if anything, feeding that resulted in something less than satiation served only to make his hunger worse. It was like a conflagration within him, interrupted only by the brief, hot explosions of fury that occurred when he encountered long-dead husks or fresh remains already picked clean of edible material, or when a smaller trilobite was able to squirm free of the four pairs of appendages serving his wide, underslung mouth.

Such escapes were frequent because he was not by nature a carnivore and, in that continuing fire of hunger and anger, emotions like caution and fear were obliterated before they could properly form.

Then he encountered a trilobite that did not try to escape, because it was trapped between the long narrow shell of the cephalopod and himself. The muddy water

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around the carnivore's head had grown clearer, indicating that it was finishing off its victim. The image registered clearly on his visual equipment and was transmitted accurately to his crude equivalent of a brain, but the warning that accompanied it was like a glass of water on a forest fire.

This trilobite was larger than others of its kind currently infesting the sandy bottom—almost half as big as he was himself—and it had rolled itself tightly into a ball to protect its vulnerable underbelly. He probed angrily with his antenna and head appendages, but succeeded only in removing a few of the small and weaker legs from the tail section. It rolled itself into an even tighter ball and he swarmed over it again and again, his hunger and frustration making it impossible for him to think.

But he did not need to think. A purely defensive and involuntary reflex, triggered when his victim's tightly rolled body opened briefly to trap and damage one of his antennae, gave him the advantage. It caused him to roll his body tightly around that of his victim. He maintained the hold, squeezing harder and harder while the other's body segments telescoped and their connecting sutures snapped and pulpy flesh began oozing from the organic wreckage.

But the struggle had stirred up the mud and sand around him to such an extent that when he uncurled from the crushed body he could barely see it, although that did not stop him from feeding. It did, however, prevent him from seeing that the cephalopod had finished with its victim and, attracted by the disturbance, was seeking another.

It found two.

He was feeding when the forest of tentacles wrapped itself around both his victim and himself and began pulling them into the cephalopod's enormous maw. He went on feeding while the hot, constant flame of his hunger became punctuated by explosions of pain as his appendages were twisted and crushed and torn away and as more and more of his body segments collapsed under the pressure of the cephalopod's teeth. He was still eating and being eaten when the triple fires of his pain, anger and hunger faded and died . . .

GOOD MORNING DEVLIN. SHIP STATUS TWO HUNDRED EIGHTY-TWO YEARS INTO MISSION. ALL SYSTEMS FUNCTIONING. SHIP PERSONNEL CURRENTLY AWAKE—ONE. IDENTITY JOHN DEVLIN.

"ARE you sure I'm awake?" His dream of being a recently defunct trilobite on the muddy bottom of a silurian sea was still very much with him and would require no effort of memory to recall. For a time he had been a tiny organism whose blind fury had been the direct cause of its violent end. But he was now fairly sure that it had not been intelligent, that its continued survival had been a matter of pure luck and that the impressions he had gained of

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forethought and the ability to learn from experience were false. The intelligent dreamer, himself, had given an aura of intelligence to his dream creature which had, in fact, been driven by nothing more than blind instinct.

Hunger and blind instinct were still driving people to acts of violence—at least, they had been two hundred and eighty-two years ago. He tried hard not to think about the time that had passed and think instead about the present and himself.

He was still very hungry.

IT IS ASSUMED THAT YOU REMEMBER YOUR FIRST TEST AWAKENING AND THE ACCOMPANYING INSTRUCTIONS. DURING THIS AND SUBSEQUENT AWAKENINGS THESE INSTRUCTIONS WILL NOT BE RESTATED UNLESS THE ORIGINAL MEMORY IS OCCLUDED OR NO LONGER AVAILABLE OR THERE IS EVIDENCE OF SEVERE MENTAL DISORIENTATION.

SHOULD ONE OF THESE SITUATIONS ARISE PRESS FIRMLY ON THE PEDAL BELOW YOUR LEFT FOOT FOR BASIC MISSION RE-EDUCATION MATERIAL.

"No, thanks," said Devlin. He recalled having to sit for three hours watching that re-education film, which had begun by assuming that the viewer had the mind of a retarded child.

REASONS FOR AWAKENING. TO GUIDE COMPUTER IN MAKING NON-URGENT DECISION. TO CHECK FUNCTIONING OF DEVLIN MUSCLE SYSTEMS, CIRCULATION, DIGESTIVE TRACT . . .

"Bless you!"

. . . SPEECH ORGAN AND MEMORY.

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PERIOD OF AWAKENING FORTY-EIGHT HOURS.

CARRY OUT INSTRUCTIONS SPEAK, EXERCISE, EAT AND REMEMBER.

Devlin exercised gently, then released the casket's hinged side. The cubicle's heaters were coating his skin with a film of warmth, making him think of one of his mother's baked alaskas—a hot crust surrounding a filling of still-frozen ice cream. But his icy center thawed quickly and he returned his attention to the displays.

ADDITIONAL TO INSTRUCTION EAT. FOUR MAJOR MEALS OF APPROXIMATELY 1000 CALORIES EACH WILL BE TAKEN DURING THE NEXT 36 HOURS. LIQUID INTAKE WILL CEASE EIGHT HOURS BEFORE COOL-DOWN.

ADDITIONAL TO INSTRUCTION REMEMBER. RECALL EVERYTHING POSSIBLE OF RECENT COLD-DREAM SEQUENCE. RECALL AVAILABLE MEMORIES OF SHIP ENVIRONMENT BEFORE LEAVING CUBICLE. PROCEED TO CONTROL CENTER WHEN READY.

"No," said Devlin firmly.

He had been told how important it was that he remember his cold dreams and store them in his waking memory in as much detail as possible. The reasons he had been given for doing so were in part psychological, biological and perhaps even philosophical—after all, he had been dead in every medical sense of the word for more than three average lifetimes.

BY ITS very nature long-term hibernation anesthesia could be tried, but it could never be adequately tested. During the years following its perfection as a method of suspending animation for indefinite periods there had been no shortage of volunteers wishing to undergo the process—people with diseases incurable by the medical science of the day, or those simply wanting to awaken into a better world. But data was still lacking on the biological and psychological side effects, if any, on really long-term subjects.

It had been thought at first that there were no harmful side effects, but the medics responsible for hyperthermia processing on the starship project said that they must be absolutely sure. They were worried, it seemed, by a slight tendency toward disorientation and forgetfulness, so minor as to be virtually undetectable.

But on a voyage that might last for a thousand years even a tendency toward mental confusion and forgetfulness could be deadly.

Forced, as they were, by the necessity of finding an answer to a problem that quite possibly did not exist, medical scientists could only theorize and try to guard against all theoretical eventualities.

The most generally accepted and worrying theory was that ultra long-term suspension would greatly increase disorientation and memory impairment and that the harmful effects would not increase proportionately, but multiply with the passage of time. Extended periods in low temperatures could well bring about a leakage in the electro-biological system which coded and stored the memory impulses—and the end result would be a starship crew

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member or colonist being revived in perfect health—but without a single thought in his head.

To guard against this purely theoretical disaster the medics had decided to revive the travelers at lengthy intervals—one hundred and fifty to two hundred years—during the voyage. More frequent awakenings would have placed a severe strain on the ship's power reserves and consumables. It was also thought necessary to provide a link between the awakened mind and the frigid and not quite arrested mind of the cold sleeper.

The minds on the ship had to be continuously occupied, insisted the project psychologist. They had to engage themselves with dreaming during the centuries of frigid suspension and, while awake, perform exercises in recall so that the original memory store and linkages would be periodically reinforced instead of being lost.

Dreams were, after all, simply an involuntary form of memory recall.

"But there must be more to it than that," said Devlin suddenly. "Or else that book they made me read on prehistory left a bigger impression than I realized."

He was remembering the shocking clarity of sensory detail in his last dream memory and he decided firmly that it required no further reinforcing. Saying "No—" to the computer might or might not produce dramatic results, but if the thing had been telling the truth in the first place it had probably noted the word as a sound—and proof only that he was obeying the instruction to speak and not disobeying the order to recall his dream. That last dream was still too uncomfortably fresh.

Instead he turned his mind to the layout, organization and control of the starship—and deliberately ignored the food dispenser—as he moved into the corridor to continue his physical exercises. He was a human being in full control of his mind and instincts, not an insanely hungry trilobite.

The display had a new message for him on his return.

REMEMBER. EAT. PROCEED TO CONTROL CENTER.

III

THE ship moved imperceptibly among the stars and the dreams trickled even more slowly through the minds of its occupants, with one exception. That was the man who occupied one of the two control positions and was not moving at all.

It was not that Devlin did not know what to do. The memory of his training—minimal as would be expected for a fully automated and computerized ship—was sharp, complete and recent despite the fact that in real time it was two hundred and eighty-odd years in the past. Possibly it was the silence that kept him motionless—he was the only component in the ship making a noise—or simply the fact that he was all alone—or the knowledge that he was not truly alone and was afraid of the ghosts of people who were not really dead . . .

Devlin shivered, even though the heaters had long since raised the temperature to a comfortable level,

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and forced a laugh. Of one thing he could be sure, the people in this ship would never walk in their sleep.

CENTRAL COMPUTER READY.

The display had been saying this from the moment he had taken the control position.

This was a different breed of computer from the one that supervised his awakenings and nagged at him to do the proper physical and mental exercises. As far as this one was concerned, Devlin was expected to know his stuff. This was, in short, a highly professional computer that would stand for no nonsense.

Apart from these purely subjective impressions, Devlin thought wryly, it was exactly the same as the other computer—it possessed no human attributes whatsoever. He leaned forward and tapped the button labeled: Report.

SITUATION REPORT. SHIP IS CLOSING TARGET SYSTEM THREE TO MAKE APPROACH WITHIN TWO HUNDRED MILLION MILES OF PRIMARY. FIRST TWO SOLAR SYSTEMS VISITED OBVIOUSLY NOT SUITABLE FOR SEEDING AND BYPASSED WITHOUT CREW CONSULTATION. TARGET THREE REQUIRES HUMAN EVALUATION OF DATA FOR DECISION. ASTRONOMICAL AND GEOPHYSICAL DATA ON MOST SUITABLE PLANET FOLLOWS . . .

Devlin tapped the Hold button to give himself time to think and to control his anger and disappointment.

The starship's course had been plotted to take it through ten solar systems that lay in a fairly straight line from Earth, and most of these had been thought to contain planets with a high probability of being suitable for colonization. That being the case the first target should also have been the ship's final destination—to assume that the observational data on the nearest target system would be the most accurate had been only natural. And the probability of the colonists' finding a suitable world on their second target should also have been high. But the farther the ship traveled the more they would have to rely on chance, the greater the danger of their having to cope with a possible malfunction in the ship's hyperthermia caskets, guidance and propulsion systems—or even in the periodically frozen organic computers belonging to its occupants.

Devlin remembered the words of old Carewe, the man responsible for the design of the long-range geophysical sensors, who also had been angry and disappointed because he had been chained to Earth by age and a disease which in a lesser individual would have been terminal.

"This ship is the most intricate, sophisticated, foolproof fabrication ever to be conceived and built by man," he had said at the conclusion of his first lecture, "but it is only a bloody machine."

Devlin's anger now derived chiefly from the fact that the machine had bypassed two likely solar systems without consulting a member of the crew. Perhaps it also came from a fear that the machine could not be trusted—and he wondered what he could do if a playback on the two earlier fly-bys showed that they had bypassed a suitable colony world.

He tried to control this fear and

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make himself think. The first two target systems had been bypassed without crew consultation, the computer was saying, and it meant just that. But members of the crew could be awakened for other reasons—and he should also have remembered that.

STILL without releasing the Hold button he called up crew status data. Like the occupants of the colonist sections—who were not supposed to leave their cubicles until after the landing—two crew members had been awakened once for physical and mental exercise. The display showed a pale blue Exercise Only light burning against each name—one was his. His name was also tagged with his present orange Decision Awakening light and his crew mate's name carried the yellow light that indicated an awakening for observation purposes only.

A quick check showed that the observation awakening coincided with the fly-by time on one of the bypassed systems. He knew the crew member concerned very well. She was not the type to sit idly by if the world they had been passing had been suitable for colonization.

Devlin swung back to the main display. He said, "For all the unkind things I have been thinking about you, I am truly sorry," and released the Hold.

The information came in bright, sharp, silent words. It was a system comprising seven planets held by a sun approaching middle age, stable and emitting radiation of an acceptable type and intensity. Six of the worlds were unsuitable, either too close to or too distant from the primary, and the display gave brief details of the planetary diameters, gravity, temperature, atmospheric pressure or the lack of it. The remaining one, third from the sun, was within the temperature and light zone in which planetary life could evolve—and it had.

He jabbed the button marked Visual and divided his attention between the data display and the pictures on the side screen.

Planet Three was enormous, a rapidly spinning globe composed of semi-molten material, superheated liquid and a wide-flung, roiling gas envelope that warmed its two satellites like a second sun. Satellite A was a ten-mile-wide chip of rock that orbited its primary every twelve hours, while Satellite B was much

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larger, more distant and sedate in its rotational movement—and the second most beautiful world that Devlin had seen.

He blinked away a temporary impairment of the Devlin visual equipment and concentrated on the data display. In the stillness of the ship his breath sounded like an interrupted gale and his heart was banging against his rib cage as if it wanted out.

EQUATORIAL DIAMETER 7,540 MILES. ROTATIONAL PERIOD NINETEEN POINT ONE SEVEN HOURS. GRAVITY POINT NINE FOUR EARTH NORMAL. ATMOSPHERIC PRESSURE THIRTEEN POINT SEVEN POUNDS/SQUARE INCH. COMPOSITION SUITABLE FOR HUMAN LIFE. WIDESPREAD FLORA. DETAILS OF FAUNA AWAITING LANDING OF PROBE. NO INDICATION OF RADIATION OR POLLUTANTS PRODUCED BY TECHNICALLY ADVANCED CULTURE.

Devlin jabbed the Hold button so hard that he cracked his fingernail.

Third time lucky . . .

He wanted suddenly to shout so loudly that the silent ship would never get over the shock, so loudly that it would disturb even the slow, frigid dreaming of the colonists. And that wasn't such a bad idea, because this was the sort of good news that should be shared as soon as possible.

It was completely against the rules, of course. The manual overrides were not supposed to be used to awaken people except in cases of extreme emergency and this was anything but an emergency. But the control center was designed for two people and six could probably squeeze in at a pinch. They would be able to see their future home for a few minutes before they returned to their cold dreams, because planetfall was still a long way off in time and distance.

The ship would have to go away and come back again.

THERE was nothing wrong with his memory, Devlin thought happily—he could remember every word, every line drawn by the electronic pointer and every nuance of Carewe's voice as he had outlined the approach, reapproach and landing sequences. Perhaps the reason Devlin remembered the instructions so well was that they made up the knowledge that would be used only when the mission's goal had been achieved. Despite the sarcastic, hectoring manner of old Carewe, who had invariably spoken to his audience like an Einstein who was trying to make his Special Theory comprehensible to a bunch of ten-year-olds, it had been the most popular lecture in the whole training course.

In case the first or second or sixth target stars proved unsuitable, Carewe had said, the ship would not, as was customary in interplanetary flights, accelerate for half the distance to its proposed destination and decelerate during the remainder of the trip. To do so would save time but be very wasteful of power. With their life suspension techniques they could afford to waste time, but the ship's power reserves had to be conserved for a second or a third or an umpteenth try.

That was why acceleration would be gradual and applied over many decades, until the ship had achieved a velocity just over one-quarter that of

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light. This velocity would be maintained until a system with a suitable planet was found.

Only then would the ship decelerate, just as gradually checking its tremendous velocity and converting its fly-by into a cometary return orbit—and many decades would pass before general awakening and landing.

Caution diluted Devlin's happiness as he thought of the colonists crowding into the control center seven at a time. Awakening the first seven would be relatively easy—they in turn could awaken the others before returning to the cubicles. But some of them might not want to be reprocessed after only a few minutes of looking at their new world. Some would probably want to study the probe data and others might want to hang around or start celebrating. It was not impossible that all the people on the ship might be awake at the same time, crowding the control center, corridors and cubicles and placing a severe strain on the heating reserves and food dispensers. Intrapersonal difficulties might arise, even arguments.

His instructions, Devlin reminded himself once again, were that no more than the two crew members were to be awake at one time unless an emergency dictated otherwise. Good news like this and the natural urge to spread it around were the very antithesis of an emergency. But he might bend the rules just a little and spread the good news to one other person.

His last meeting with her, in biological time, had been only ten hours ago.

They had been sitting on the edges of their suspension caskets in the dormitory that held the colonists who had just completed their training courses—some of them had been cooled for more than a year to preserve their precious biological time while the later arrivals were being trained. Classes had been small. The training could not have been described as intensive and on its completion cooldown was immediate. The latest batch, like the first, would awaken on the ship somewhere between the stars. She had been sitting facing him, a slim, dark-haired beautiful girl shivering in her open-mesh coldsuit while she waited for the signal to get into the casket and lie down. She had smiled at him when he smiled at her.

Patricia Morley had been undemonstrative but not unfriendly. When the two-minute warning had sounded he had reached forward to take her hand, meaning to say something that would probably have sounded trite. But she had spoken first.

"Just suppose," she said quietly and seriously, "that these caskets malfunction. Do you think that we will know when we become permanently instead of temporarily dead?"

Devlin had shivered with more than the cold and said, "Pleasant dreams."

For a few seconds she had gripped his hand so tightly that he had still felt it tingling when the cold explosion came. At that moment he had been remembering the advice of one of the project psychologists who had insisted that pairing-off should wait until planetfall, when the pool would

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include everyone on the ship, and that pairings among training groups had a much lower probability of success. But right now he wanted to awaken her with his good news and go on from there.

He laughed out loud and released the Hold.

ENVIRONMENT OF PLANET THREE B COMPLETELY SUITABLE FOR HUMAN COLONIZATION ON A SHORT-TERM BASIS.

"What—" began Devlin. The computer ignored him, but answered anyway.

PLANET THREE B IS CURRENTLY ENTERING ROCHE'S LIMIT AND WILL SHORTLY BREAK UP TO BECOME A RING SYSTEM OF ITS PRIMARY.

DEVLIN thought about the kind of life they could lead on the Earthlike satellite of Planet Three, the clean air and unpolluted oceans and the fresh green vegetation that covered the land surfaces like chlorophyl paint. He thought of the night sky with that tremendous primary shining above them, the fantastic play of light and shade and color when the sun shared the sky with it and the beautiful spectacle of an eclipse.

"No," he whispered.

BREAKUP TIME IS DIFFICULT TO PREDICT WITH ACCURACY. PLANET THREE B ALREADY SHOWS VOLCANIC ACTIVITY ABOVE THE NORM FOR BODIES OF THIS AGE AND MASS. SUCH ACTIVITY WILL BECOME WIDESPREAD WITHIN THE NEXT TWO CENTURIES. HUMAN OCCUPATION IMPOSSIBLE WITHIN THREE CENTURIES DUE TO RELEASE OF TOXIC GASES FROM VOLCANOES AND FISSURES. ELEVATED TEMPERATURES CAUSED BY POOLS OF MAGMA OCCUPYING LARGE AREAS OF THE SURFACE IS ALSO A FACTOR. PHYSICAL BREAKUP IS ESTIMATED AT LESS THAN FOUR HUNDRED YEARS.

DECISION REQUIRED LANDING/NO LANDING.

Devlin swung away from the console and out of the control center, wanting desperately to find something or someone who would make the awful pain of disappointment go away. He stopped outside his cubicle. The big red manual override handle on Patricia's door was within easy reach, but if he had refused to awaken her to tell the good news there could be no excuse for his doing so to tell her about this. He swore horribly and went into his cubicle and began pushing buttons on the food dispenser.

The wall and ceiling displays were saying:

DECISION REQUIRED IN CONTROL CENTER.

He went on swearing at them, but in the end his emotional heat and the warmth imparted by the hot food faded before the cold radiating from his casket and he returned to the control center. The right decision was obvious.

But he did not make it at once. For a long time he lay watching Three B on the screen. It hung like a great, cloud-wrapped vision of heaven—a planet-sized egg waiting to be fertilized and to grow and be stillborn. There could be only one decision and he took it, but not until after he had rerun all the data on Three B and called up more detailed information from his sensors, and

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spent many hours exercising his brain with thoughts that were psychologically undesirable.

Finally he tapped:

NO LANDING. CONTINUE ON PROGRAMED COURSE TO TARGET FOUR.

The display replied:

RETURN TO SUSPENSION CASKET, COOLDOWN IN FORTY-TWO MINUTES.

"The sooner," said Devlin bitterly, "the better.'

IV

The days were long and happy and full of incident—usually the same kind of incident. Day after day he sunned himself on the edge of the swamp or pastured among the aquatic plants or fed on the palm fronds within reach. The changes came too slowly to be perceptible at first, taking many thousands of long, warm, contented days to become manifest.

He was vaguely aware that the deep area of the swamp had become shallower and that when he pushed against the trees in an attempt to reach the higher fronds they tore up their roots or splintered and fell, so that he was able to reach down for the food he wanted. Gradually everything seemed to be growing smaller and he became aware, very slowly, that it was himself who was growing larger and more mature.

The internal upheaval of puberty and his first incredibly awkward attempts at mating made him fully aware of his growth and took the calm, contented sameness out of the nearly infinite succession of days. But then even those gargantuan heavings and squirmings became just another aspect of his life and the days passed in their thousands until the one when he nearly died.

He had been sunning himself on a raised shelf of land close to the swamp, sleepily digesting his last meal, when the young saurian appeared between his prone body and the safety of the swamp. It was a small reptile—perhaps only a fifth of his own mass—and stupid enough for the difference in size not to worry it. But its small size and consequent lack of inertia made the attack incredibly fast.

It was his first experience with a carnivorous reptile and, until the razor-sharp teeth raked his flank, the appearance of the saurian had made him feel uneasy rather than frightened. But the savage pain put an abrupt end to his slow, contented thinking and, awkward and uncoordinated, he struggled to his feet while his head swept around in a wide arc so that he could see what his attacker was doing.

The saurian, who until then had been able only to tear at the surface of the enormous wall that was his flank, now transferred its attention to his rear left leg. The teeth sank in like multiple rows of daggers,

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the jaw locked in position and it began to pull and twist at the upper section of the leg.

An avalanche of pain impulses from the damaged member engulfed the rudimentary brain in the sacral area long before it registered in the forty-feet distant brain in his head, and that collection of nerve ganglia reacted at once, automatically withdrawing the leg in an attempt to remove it from danger. Already in an unbalanced condition because of the weight and position of his massive neck, withdrawal of the leg from the ground caused him to topple ponderously on to his side and on top of his attacker.

He could feel bones snapping and the other's shrill hiss of pain as he collapsed and the sensations continued during the few minutes it took for him to regain his feet. By that time he could see that the creature's skeleton was seriously distorted and compressed, with bones showing like misplaced teeth in the long, ruptured wounds, and that there had been a considerable loss of internal body material and fluids.

The saurian was still alive, but unable to move very far, and the scavenging insects and small predators were already converging on it. He did not eat meat and had no reason to stay, so he moved painfully toward the deeper areas of the swamp where he could pasture and cool the fire in his leg and think slow, contented thoughts again.

Once again the days crawled past while he wallowed and pastured and sunned himself in the Jurassic swampland, but there was no mating and very little travel because of his reduced mobility and the raging fire in his leg. One day he was unable to get up and the days succeeded each other once again—but slowly now and perceptibly different and filled with pain.

Fortunately or unfortunately the large carnivorous reptiles did not find him, so that he lay undisturbed for a long time. Unable to reach the tremendous quantities of food needed to maintain his gigantic body, he grew steadily weaker. But a long time is needed for a mountain to die, even one of flesh and bone, and the days dragged on while, no longer able to move, he lay with his head turned around so that he could see the thick, angular lump of corruption that his leg had become.

By then a new fire had started along the parts of his body that were in contact with the ground—the slow, persistent erosion of insects and tiny carnivores who could not wait for him to die.

The days passed, far too many of them, and very gradually the fire and the hunger and all the other sensations faded and were gone.

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DEVLIN remained still for the first few minutes after his awakening, hoping that if he did not move or open his eyes the computer would be fooled into thinking that he was still unconscious.

He needed time to think.

His long happy dream life as a brontosaurus and the long and unhappy death which, as far as he was concerned, had ended only a few minutes earlier, were worrying him. The images and sensations had been sharp—and the remarkable lack of compression or vagueness in the dream-elapsed time was frightening. He had been given books to read on a wide range of unrelated subjects which had included prehistory—to give his cold-sleeping brain something to work on, the chief psychologist had told him—but the material had consisted of simple popularizations of the relevant branch of science or period in history. They had not given him any information or insight on how it felt to be a trilobite or a brontosaurus, nor had they described in such exact detail the structure and coloring of the Jurassic palm fronds or the various types of aquatic vegetation on which he had lived.

Certainly no one had shown him a picture of the improbably marked pink and gray nightmare that had been the young allosaurus which had attacked and ultimately killed him.

To dream the lifetime of a brontosaurus—which could cover anything up to a couple of centuries—in such detail indicated a very fertile imagination. Considering the paucity of material available to him and the many, many years of cold dreaming that stretched ahead, the thought of what might happen in his dream future scared him stiff.

The dreams were supposed to keep his mind alive in an otherwise dead and deep-frozen body, but if the dreams were to become centuries-long nightmares the mind they kept alive might not remain sane.

He wondered if it would be possible for the dreamer to exercise more control over his dream, to make it more pleasant and to shut out the nightmarish aspects. In the last dream he, personally, had been aware of what had been going on. He had viewed the events and experienced the sensations as an intelligent being, even though the giant saurian, with two rudimentary brains to control its far-flung limbs and musculature, had not had enough intelligence to learn by observation rather than experience to avoid danger.

But if Devlin had taken a more active part in the dream he should have been able to make his enormous, brainless and insubstantial monster avoid the allosaurus, or he should at least have made it stay where it was—on dry ground—for a couple of days while the sunlight and fresh air healed the wounded leg, instead of dragging it through that stinking swamp . . .

A DULL shock, unpleasant but not painful, jolted his body and instinctively he opened his eyes.

DUE TO SLOW RESPONSE YOUR AWAKENING HAS BEEN STIMULATED ELECTRICALLY. IF THERE IS ANY DISORIENTATION OR OCCLUSION OF MEMORY REGARDING EARLY BASIC INSTRUCTIONS PRESS FIRMLY ON

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PEDAL BELOW LEFT FOOT FOR BASIC REORIENTATION MATERIAL.

IF PEDAL IS NOT DEPRESSED IN TEN SECONDS IT IS ASSUMED THAT NO DISORIENTATION OR MEMORY IMPAIRMENT IS PRESENT AND CURRENT MISSION INFORMATION/INSTRUCTIONS WILL FOLLOW.

"You think," said Devlin drily, "of nearly everything."

GOOD MORNING DEVLIN. SHIP STATUS THREE HUNDRED AND TWENTY THREE YEARS INTO MISSION, SHIP PERSONNEL CURRENTLY AWAKE–ONE POSSIBLY TWO. IDENTITIES JOHN DEVLIN AND YVONNE CALDWELL.

Only forty-one years since his last cooldown. It could hardly be another fly-by–and the Caldwell girl was one of the colonists.

REASONS FOR AWAKENING. TO CHECK ON POSSIBLE ORGANIC MALFUNCTION IN CUBICLE THIRTY-ONE BLUE MODULE. TO CHECK FUNCTIONING OF DEVLIN MUSCLE SYSTEMS, CIRCULATION, SPEECH ORGAN AND MEMORY.

PERIOD OF AWAKENING DEPENDENT ON TIME NECESSARY TO CHECK MALFUNCTION. NO FOOD INTAKE UNLESS PERIOD EXCEEDS TWENTY-FOUR HOURS.

Devlin had already begun the initial exercises when the display flashed another message.

CARRY OUT INSTRUCTIONS SPEAK, EXERCISE, REMEMBER AND CHECK MALFUNCTION.

And another.

ADDITIONAL TO INSTRUCTION EXERCISE. COMPLY WITH THIS INSTRUCTION ON WAY TO CONTROL CENTER AND TO SITE OF MALFUNCTION. INSTRUCTIONS SPEAK AND REMEMBER TO PROCEED IN CONJUNCTION WITH INSTRUCTIONS EXERCISE AND CHECK MALFUNCTION. INFORMATION REGARDING MALFUNCTION IS AVAILABLE IN THE CONTROL CENTER.

ADDITIONAL TO INSTRUCTION REMEMBER: AS MUCH TIME AS POSSIBLE TO BE SPENT IN RECALLING DAY IN DEVLIN RECENT PAST. RECALL SHOULD BE COMPLETE AND ACCURATE. IF TIME BEFORE COOLDOWN PERMITS, RECALL ASSOCIATED MEMORIES AND CHECK FOR GAPS.

"If the malfunction is serious," said Devlin angrily, "I might not be able to think of anything else."

When he reached the control center the colonist status display for the Blue module told him that the colonists had all been awakened three times. All the lights were pale blue because the people in that, and in the other three modules, were not required to make observations or decisions or deal with emergencies. All they could do was exercise their minds and bodies on each awakening and very occasionally eat.

Three pale blue Exercise Awakening lights burned steadily against Blue 31, indicating three successful awakenings and subsequent cooldowns. But a fourth light winked off and on as if it could not make up its mind.

INFORMATION ON POSSIBLE ORGANIC MALFUNCTION IN BLUE THIRTY-ONE. ELAPSED TIME SINCE LAST WARMUP ONE HOUR TWELVE MINUTES. CUBICLE SENSORS INDICATED INCREASING PHYSICAL ACTIVITY AND SPEECH UNTIL FIVE SECONDS BEFORE COOLDOWN. SEN-

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SORS REGISTERED VIBRATIONS AND INTERMITTENT STRESS ON CUBICLE DOOR. NO STRUCTURAL DAMAGE. NO CIRCUIT DAMAGE. NO ACTIVATION OF EMERGENCY HOLD CONTROL. COOLDOWN INITIATED. DATA RECEIVED FROM ORGANIC SENSORS UNSATISFACTORY. ORGANIC DAMAGE SUSPECTED. EMERGENCY WARMUP OF CREW MEMBER DEVLIN INITIATED.

WARNING. HUMAN INVESTIGATION OF MALFUNCTION REQUIRES USE OF THERMAL SUIT.

Five minutes to don the thermal suit, Devlin estimated, and another five to strap on the air tank and heater and perhaps another minute to put the tools of his trade into an insulated container. The organic malfunction could be serious or trivial, but he did not want the organism concerned to complain later about being jabbed with a needle that had a temperature close to absolute zero. Then there would be another ten minutes getting from the control center to the Blue module and cracking the cubicle seal.

DOUBLE-CHECK THERMAL SUIT SEALING, AIR SUPPLY AND HEATING SYSTEM.

He lost another minute doing as he had been told, but made it up on the way to Blue 31.

As in the other colonist modules, heating was used only during the periodic awakenings and was confined to the cubicles. Devlin was not really aware of the absolute, killing cold outside his suit until he bent his arm to activate the seal release and the revivification Hold switch. The lining of his thermal suit creased in the fold of his arm, compressing the insulating foam, and for a moment he thought that his elbow joint would seize up and the blood in the area congeal.

AT FIRST glance it looked as though the girl were kneeling in prayer beside her casket. Her head and arms were inside, held there by the edge of the hinged flap which, for some reason, was in the closed vertical position. Obviously she had been trying to climb into the closed casket when cooldown began and the radiation had hit her. That radiation was potent stuff and was designed to achieve molecular arrest and plunge the subject to a temperature close to absolute zero so quickly that cell damage could not occur—and it was focused only on the contents of the casket. As a result her head, arms and body down to a level slightly below the waist had been reprocessed in the normal way while the rest of her had cooled not so rapidly.

Devlin swore and moved closer to carry out a quick visual examination.

She was small and slim and looked to be about eighteen. Her eyes were open and there were two thin patches of ice on her cheeks where tears had frozen. He saw indications of bruisings on the outside edges of her hands and on her knuckles, as if she had been beating at something with her fists, but no other outward signs of physical injury.

Very carefully he lifted her into the casket—in the cooled-down condition human tissue was brittle and highly susceptible to damage. She lay with her knees projecting above the edge while her arms reached grotesquely upward, like one of the

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undressed female window-display models he used to stare at as a growing boy when he thought his mother wasn't looking. They, too, had been cold and stiff and unbelievably lifelike, but none of the display staff had thought of giving them plastic tears. When he was sure that all of her body was in radiation focus he went outside and canceled the revivification Hold.

Like the cooldown treatment, the radiation designed to reverse the process was also potent stuff and deadly to anyone who was already revived.

When he went in again she was not yet conscious. He moved her into a more comfortable position and replaced the arm hanging over the edge of the casket. The heaters had raised the temperature sufficiently for him to do without his suit and by the time he had opened the helmet she was coming awake. He pulled off his gauntlets and put his hand to her forehead.

"Relax," he said gently. "Do not make any sudden movements."

Her eyes opened and she said, "I'm cold. My legs are asleep and my hands—"

"That," lied Devlin quietly, "is because you woke up before they did."

Her respiration was normal and the partial and premature cooldown had not affected mentation, but, considering her position at the time, that was not surprising. He thought that her hands must have slipped over the opposite side of the casket during the cooldown instant and dropped back inside when she had slipped backward.

Suddenly she smiled and said apologetically, "I was stupid. It wasn't claustrophobia or anything—I just wanted to see Brian for a minute. The display said we were three hundred years older and I thought, something might have happened to him in all that time. I wanted . . . I even beat on the door with my fists before I realized how stupid that was. By then it was only a few seconds from cooldown and I rushed to the casket so quickly that my knee hit the flap and knocked it shut and the computer thought I was in it and—"

"So that's how it happened," said Devlin.

She nodded and said, "I'm still very cold."

"I'll get you some warm food," said Devlin, going to the dispenser. "Don't move. I'll feed you. But talk as much as you want to."

"The computer didn't say that I could eat—" she began doubtfully.

"Doctor's orders," said Devlin.

She obviously enjoyed the hot meal, even though she seemed to be increasingly ill at ease and her color was high. Apparently she had become aware of the fact that there was a man in her cubicle who was not her Brian—and that the suspension garment was little more than a collection of holes held together by fine wire. But the flush stopped short below waist level and a few inches above her wrists. And the areas of bluish white skin bordering these lines of demarcation were increasing perceptibly as he watched.

Circulation had already ceased at the extremities and she had only a few minutes to live.

"Brian is doing fine," said Devlin,

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keeping his eyes on her face. "If anything had gone wrong in his cubicle I would have been awakened to deal with it, just as in your case. But I'm afraid all you'll be able to do is dream about him for a while.'

She smiled again. "All I seem to dream about is being a lady dinosaur."

"They made you read that book, too?"

She shook her head slowly. "They told me to, but I didn't and read a historical romance instead. Learning about dinosaurs isn't useful to a colonist so I didn't bother, but I still dreamed about being one so clearly that—" She broke off. Her breathing became labored and uneven and she looked suddenly frightened. She said, "I'm terribly cold. What—what's happening to me?"

"You'll be all right," said Devlin reassuringly and put his hand on her forehead again. "You're doing fine."

A few minutes later he closed her eyes and left the cubicle.

HE TRIED not to let her face and figure and her manner register with him as he shut down the computer outlet and suspension equipment and for a while he thought that he had succeeded. In the old days he used to have no trouble forgetting that kind of thing—perhaps because there had been so much of it. But recently his memory had become unusually retentive—even when he was only remembering dreams—and he could no longer trust himself to forget.

By the time he had returned to central control and stowed the thermal suit, less than two hours had passed since his awakening. The status display for Blue 31 now read:

ORGANIC FAILURE.

Devlin tapped instructions for his own cooldown in one hour and returned to his cubicle.

His instructions were waiting.

REMAINING TIME BEFORE COOLDOWN TO BE SPENT REMEMBERING ONE DAY IN DEVLIN RECENT PAST. RECALL SHOULD BE COMPLETE AND ACCURATE AND INCLUDE ASSOCIATED MEMORIES. IF TIME AVAILABLE IS INSUFFICIENT COOLDOWN HOLD SHOULD BE ACTIVATED UNTIL RECALL IS COMPLETE.

V

EVERY day he awoke in a room not much larger than the starship suspension cubicle which, at that time, was still in his future. His room expanded considerably when the bed folded into its wall recess to become a set of well-filled bookshelves—glassed in, of course, to keep the books from falling out when it was being used as a bed—and contracted again when the dining table and stool came out. But he did not notice the cramped conditions or the pitifully few touches he had been able to give the place to express his individuality, or the taste of the food he pushed in the general direction of his face, because normally he did not come fully awake until he had been up and about for at least an hour.

By that time he had tidied up, converted the room to its daytime mode and unlocked the waiting room in readiness for morning surgery. The waiting room was the largest of the three, holding up to nine people

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uncomfortably, and his office was the smallest. Into this shoebox were fitted an examination couch, a combination desk and drug cabinet and a folding chair for patients who were well enough not to have to lie down.

Behind his desk the imitation window was transmitting a picture of the surrounding apartment buildings, rising like bottomless pillars from the early morning smog. The clock on his office wall was showing six-thirty when the patients began to arrive—hobbling, sniffing, coughing and occasionally bleeding.

In a medium-sized block of apartments aggregating two thousand rooms and an average of three potential patients per room, infections of the upper respiratory tract were circulated like money. To these cases he dispensed a face mask, which the majority of them would not wear, with small doses of the indicated medication and sympathy. The sympathy was an optional extra—his option, not his patients—and the dosage varied in direct proportion to the amount of sleep he had had the previous night, the quantity of residual alcohol still in his system and various psychological factors.

When the patient was old and/or disturbed he tried to dispense constructive sympathy no matter how rotten he felt, because that was the only form of treatment available to him and he was always trying to bring down the suicide rate in the building.

The first of the walking wounded arrived on the arm of a girl who helped him on to the examination couch and returned to the waiting room without speaking. Devlin judged the patient to be in his early twenties, still partially in shock and, judging by the outraged expression on his face, a bystander. The right leg of his evening coveralls was bloodstained below the knee and had been ripped open to show an even more bloodstained towel knotted tightly around the wound. The pale green material of the coveralls toned with the greenish shade of the patient's face, but clashed horribly with the primary color soaking his leg and right slipper.

"D-don't cut the towel, please," said the patient as Devlin folded back the sodden material. "My mother—it's organic wool, she says, and very expensive."

Devlin nodded and began undoing the knot.

"I suppose," said the patient, "you're wondering how I got it."

On the contrary, Devlin thought, *I am agog with disinterest.* But it would do no harm for the medic of the building to be polite and pretend that this particular wound, out of the hundreds he had already treated this week, was unique in all its aspects. To the patient—especially if it happened to be his first such injury—it was unique.

Devlin nodded again and said, "Please lie face down."

While Devlin sprayed the area with painkiller and began probing the wound for traces of coverall material that might have been carried inside by the bullet, the patient outlined the circumstances that had led to his accident.

"IT WASN'T my affair, you understand," he began angrily,

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"and they were too old for it anyway. Besides, the old fools were practically in Lunar insertion on mix eighty-two—the rec hall bars had run out of everything else—and were incapable of telling the difference between an insult and a fair comment. You know that stuff—it's supposed to be a harmless euphoric, but hydraulic fluid flavored with fruit juice has the same effect. I don't think they were even talking clearly enough to be insulting, but they insisted on having an affair there and then just to show us young folks that—that—I couldn't quite follow their reasoning."

"If they were high on eighty-two I'm not surprised," said Devlin with feeling. "Move your foot up and down and flex your toes, please."

"This was three hours ago," resumed the patient. "It was still dark but there was enough moonlight to see a man the regulation thirty yards away. My girl and I went with them to act as official witnesses and to see that the Maxers didn't interfere. We didn't expect them to be able to hit each other and we were right, but one of them got me and—"

"You demanded satisfaction," said Devlin wearily.

"Well, no," replied the other. "They expected me to, of course, and I never saw two old boys sober up so fast, but the situation was complicated. One of them was my old man and the other was my girl's old man. My mother wouldn't approve of me having an affair with Dad—and this girl I'd like to keep permanently. If she called me out I wouldn't like it at all. I don't approve of affairs of honor between men and women," he said seriously.

Devlin squirted wide-spectrum antibiotics into the entry and exit wounds and began to tape a dressing in place before he spoke. "You are a believer in men's upholding the honor of women, but not in women's upholding their own?"

"No. Not exactly."

"Maybe it is just that you can't abide male property—the female of the species, in this case—being able to shoot back. Maybe you think that it is unfair to young—or even old—males."

The patient tried to turn his head to look at Devlin—despite the fact that it was physiologically impossible for the human neck to travel through one hundred and eighty degrees. He sounded angry as he asked, "Are you suggesting that I'm some kind of Maxer? Listen, Doctor. You belong to one of the few professions excused from wearing the belt and you don't suffer loss of status by not wearing it. But that doesn't give you the right to insult—"

Devlin, who was putting the finishing touches to the dressing, paused to put his hand on the other's shoulder. He said seriously, "I did not mean to insult you and I unreservedly apologize. But I had an old man, too, and for a while there I was talking just like him. And I agree with you about mixed affairs—women are neither physically nor temperamentally suited to fighting death duels with men—and I think you behaved as a responsible Citizen should. I also agree that men should wear the trousers, but I disagree with the idea that the proper way to hold them up is by wearing a gunbelt."

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The patient was silent for a few minutes and the color of his neck and ears became a less angry shade of pink. He said, "Your apology is accepted without loss of honor by either side." He went on less formally: "Some of us have to wear belts, Doctor. As a salesman I must wear one to talk to armed executive-level people I have to do business with. If I went dressed as a sheep they wouldn't let me in to talk at all. At the same time, if I went in with too many studs on my belt they would think that I was the touchy kind who would as soon fight as sell—or a man who sells by intimidation—and I wouldn't get many more appointments. I don't want a belt loaded with studs, anyway," he ended. "People are too touchy about their honor these days."

"You can sit up now," said Devlin, then added: "Just to satisfy my curiosity—how did you extricate yourself from last night's business without staining your escutcheon?"

For a few seconds the other would not meet his eyes. Then he said apologetically, "I didn't actually tell a lie, you understand. It was just that these two old boys were blasting at each other so enthusiastically that it sounded like a commando assault—and an armed vidge from the next block could have thought that a Maxer attack was developing and decided to loose one off. After all, there is no proof that the bullet came from—"

"No need to apologize," said Devlin, holding up his hand. "If you stop to think for a minute you'll realize that I prefer people to talk their way out of trouble—it makes less work for me. As for the wound itself, come back in three days unless it begins to feel hot. And rest—don't do anything more energetic than watching television for at least a week. After you are back on your feet, wear a wound disk on your belt for at least a month."

He pressed the stud controlling the office door and, as the girl was helping the patient out, he called, "Next."

WHILE he was dealing with the succession of sniffs and coughs that followed, Devlin kept remembering that young and unusually sensible patient and the two glimpses he had had of the girl. He decided that he liked them well enough to arrange an evening meeting with them in the rec hall for a longer and more wide-ranging discussion. But there was the danger of his other patients thinking that he was playing favorites.

Even greater was the danger that, by talking too much to any of his patients, he might give someone the idea that he was not simply a medic but a medic with psychiatric experience and, just possibly, a cabinet full of the hallucinatory or personality-change drugs which were the institutional psychiatrist's stock in trade.

If a rumor got out that he was a psychiatrist his time, his property and person would never be his own again.

His last patient was last because, judging by the condition of the pad she was holding to the side of her face, she had deliberately waited until the others had been attended before coming in. Any number of the

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coughers and sniffers would, Devlin was sure, have given up their place in the line for her. She was in her early twenties. The half of her face which was not hidden by the bloodstained pad was beautiful and it was obvious from her expression that the facial injury was merely a symptom of much deeper trouble.

Even the symptom was serious enough—three deep, incised wounds running from the cheekbone to the line of the jaw and apparently inflicted with a not very sharp knife. There was a question he had to ask even though he knew what the answer must be.

"Is this a police matter?"

She shook her head.

Devlin tried to conceal his disbelief. He said, "Very well. These are deep cuts and require sutures. I can do the job myself, but frankly, my needlework isn't very neat. A good-looking girl like you needs a specialist for this sort of thing and I still have friends at Sanator Five who will help you beat others waiting in line—"

She was shaking her head again.

Leave this one alone, Devlin told himself firmly. *You are not a psychiatrist.*

Go away, himself replied, *and mind your own business.*

None of the seats in the waiting room were occupied, so he could give her extra time without being accused of playing favorites. He said, "Most of the rumors you hear about institutionalized medicine are wildly exaggerated, if not completely untrue. I did my training in Five and served there for six years and have kept in touch with some of the residents—one of whom is an expert in invisible mending. He'd see that you are not treated as just another statistic—Don't shake your head like that or you'll start bleeding again."

The trouble was, Devlin thought angrily, that the rumors about the big hospital complexes were *not* exaggerated. But he wanted to play favorites in this case and use his influence to get her special attention, because the thought of her going through the rest of her life with three ugly puckered scars on the side of

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one of the most beautiful faces he had ever seen was not to be borne—it would be like watching an old leprosy case burn itself out when the medication was available to cure the condition without wastage.

"I don't understand you," he said quietly. "If it isn't a police matter was it a family fight? A jealous lover? Why not have plastic surgery?"

She stared silently at him for a moment and Devlin thought that it was her polite way of telling him to mind his own business. Then she said firmly, "Because I did it myself."

Devlin cringed inwardly. It had taken determination to inflict that first cut, but three of them . . . .

He did not have to ask any more questions because she wanted badly to talk about her problem to someone, even though it had only one highly unsatisfactory solution. Her trouble was that she could not keep a boyfriend.

". . . the first two I hardly got to know at all," she said quietly. Having decided to talk, she spoke freely. "Somebody decided that I was too good for them and wanted me for himself. One of them died and the other was badly wounded. I wouldn't even speak to the somebody who had challenged them and for a while I wanted to apply for a belt myself. But I hadn't known them long or well enough to want revenge—I was just angry. Then I met a sheep boy—from this building—who was nice and considerate and sometimes boring about his eye condition, which kept him from wearing a belt. They couldn't call him out, but they made life miserable for him in other ways—usually by insulting me in front of our friends—so that he applied for a belt anyway. I broke it off before he could get killed, too.

"The next one was a very good shot," she rushed on, "but tried to avoid trouble. Two young men who thought that I was too good for him but an ideal piece of organic property as far as they were concerned, died. I didn't want that—it didn't prove anything except that our society has gone mad. So I thought that if I became a less desirable piece of property I would not be the cause of so many people dying or—"

"Surely there was an easier way—" Devlin stopped. His hand was covering the mutilated side of her face and he could see that she had been not only a lovely piece of organic property, her expression reflected character, determination, self-assurance and compassion, the last predominating. Obviously she would have given a lot of thought to her problem before coming up with her terrible answer.

Devlin swore long and luridly behind a calmly clinical expression and went to work.

Almost an hour later, after the neatest and most painstaking piece of surgery he had ever performed, he said, "Let me have a look at it tomorrow. And don't try to smile or you might open the—"

He broke off again, feeling his face begin to burn with embarrassment. What could she possibly find to smile at?

"I'm sorry," he said awkwardly. "The trick of putting my foot in my mouth I usually reserve for the rec hall, after a couple of liters of mix eighty-two."

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Her eyes showed sympathy for Devlin's embarrassment, which made him feel worse than ever. She said, "No need to apologize, Doctor. But if you are in the rec hall tonight and feel like doing acrobatic tricks with your foot, I'll be somewhere in Yellow area with my parents. They will probably need some cheering up."

Devlin stared at her for a long time, thinking that he could understand why people wanted to fight over her. Her *parents* needed cheering up?

He nodded finally and said, "I may see you then, provided that I am capable of seeing anything by that time. But if there is a younger male at the table I shall stagger past."

He had a sharp, mental picture of her as she had opened the surgery door. Then reality faded in with a message from the ceiling display and he was pulled from his reverie.

COOLDOWN IN FIFTEEN MINUTES. IS MEMORY RECALL COMPLETE?

"My day," said Devlin, "has hardly yet begun."

The computer would take no meaning from the words, of course, and would accept the instruction as being performed if he did nothing. But he had been asked to remember a day in the Devlin lifetime in complete and accurate detail and, whether he was driven by a sense of duty, a vestigial conscience or a tendency toward masochism, he would try to do just that. So he rose, tapped for a one-hour Hold and returned to his casket.

As the cubicle heaters came on again he sighed and resumed his not very pleasant daydream.

VI

HE HAD only one house visit to make that day. It was on the edge of the city more than seven miles away and, although he did not like the thought of a round trip of fifteen miles, he had to take some risks if he wanted to build a private practice. The high-density central areas provided resident medics for each block of apartments, but their work was listed as an essential service covered by the rental and the salary of each individual doctor was not high.

Private patients occupied family dwellings rather than apartments and had to be rich, brave or well liked to be able to survive at all in such small defensive units. The Bennetts were an unusual combination, Devlin had discovered during his two earlier visits: they were both rich and well liked.

Before leaving his office he called City Security to check on route safety and found that there was only one major trouble spot between his block and the Bennett home. Two large rival bands of Maxer mercenaries had started a shootout in the early hours at a shopping complex about four miles away. Casualties were reported to be heavy and ambulances were standing by, but they could not go in because of the danger of their being hijacked and used by the combatants as APCs. City Security forces could not go in either because the situation was complicated by the fact that pockets of property owners and members of their night staffs were trying to defend various buildings against both

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Maxer factions. The Security forces were being used merely to contain the trouble until it burned itself out. People with business in the area were advised to stay clear for at least three hours unless equipped with vehicles possessing overall armor and gas filtration apparatus.

Devlin mentally plotted a course that would skirt the trouble spot, grabbed his bag and headed for the elevator.

His armored car had been visited during the night or the late morning. On its flank someone had written with a very small finger "Please wash me" in the grime that coated the white paintwork, and all the doors were open. No fittings were missing or damaged, however, and the medical stores were disturbed but otherwise intact. It was possible that someone had investigated the unlocked car on the off-chance of finding hard drugs, but it was much more likely that one of the children from the block, sent by its parents to play in the relatively fresh air and safety of the early morning, had been indulging its curiosity as well as practicing its joined-up writing.

He drove as rapidly as possible along streets that were peaceful and thronged with shoppers. Only once did he pass a suddenly deserted area indicative of an affair about to reach its deadly climax. He did not stop to offer assistance because the city hospital service had that responsibility and professional poaching was frowned on. It was an unusually quiet morning—he heard less than a dozen shots above the traffic noises and none of them close. He was tempted to open the heavy metal hatches covering the vehicle's tiny windows and drive by direct vision instead of with his face bouncing against the periscope, but his sense of caution prevailed.

It was the generally held belief that the people responsible for the greatest amount of disorder and destruction in the city did their work at night and, because of this, tended to sleep late and leave the streets safe for law-abiding folk during the early part of the day. Like all good rules, Devlin knew from experience, this one had its exceptions.

When he arrived at the Bennett home he was checked and passed by the oldest boy, whose angry brown eyes seemed to be the only spots of color in his face. A man in a high white collar was already there. He seemed to be one of the new, relaxed breed of clergymen who occasionally swore or cracked jokes or talked a bit dirty if the situation seemed to warrant it. Even though they did good work in many places, Devlin did not completely approve of the type. An agnostic himself, he still preferred the ministers of the religions he did not believe in to be the proper, old-fashioned kind. He nodded politely.

"My name is Howard," said the minister quietly. "Brother Howard. You cannot help him."

"Can you?" asked Devlin, maintaining his politeness with an effort. It was beginning to look as if the elder Bennett had roped in a faith-healer for his son.

But the Brother was looking sympathetically toward the boy's father as he said, "Probably not, Doctor. But I shall try."

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Until then Devlin had not given much attention to the boy's father. Far too much of his mind was being taken over with thoughts of the two patients he had treated in this morning's surgery. Now he turned a more clinical eye on the father of the patient.

He saw at once that Bennett had more on his mind than a young son with a septic hand, which was responding nicely to treatment. He was moving about normally and saying the right things while his expression changed properly to match his words. But all the time his eyes were strangely empty. The mind that should have been looking out of them was somewhere else while the body was switched to auto-pilot.

Without speaking, Devlin hurried into the boy's room.

HE HAD confined Tommy Bennett to his room in an attempt to make him rest the hand and to keep the dressings as clean as possible, but now the bandages were smeared with dried watercolor—some time during the past two days since Devlin's last visit the boy had been playing with his paintbox. That was of no importance now, of course, because there was a lot more primary color on the floor by the window and on the white wool bedspread on which the boy was lying.

The boy looked pale and serious—and apparently uninjured, but that was because his red bathrobe was buttoned up to the neck so that a second look was needed to see the wide, sticky area covering his chest and abdomen. Devlin looked away, noticing the starred window and the small red-flecked crater in the opposite wall.

He cursed. He had made the mistake of liking young Tommy.

Devlin could imagine the boy standing by the direct vision window, watching the smoke rising from the distant trouble spot and listening to the shooting. One of the shots had been wide and from a high-velocity weapon a bullet traveled forever. He could imagine Tommy's father picking him up and laying him on the bed—or perhaps his mother had had to do that.

Whichever it had been, they both needed help—a couple of large-caliber tranquilizers to begin with, and possibly a course of PCs, which would give them a calmer, more fatalistic personality for the next few weeks to allow the shock to be absorbed in easy stages. But Devlin could not, of course, give them that kind of help. No medic who did not work and live in one of the big Government hospitals was allowed to prescribe such drugs.

Any drugs used for the cure or alleviation of psychiatric conditions could be misused and, in the absence of the more common hard drugs, were continually in demand. The price, until they had been withdrawn many years earlier from all but the maximum security hospitals, had very often been the life of the doctor who had carried or stocked them in his surgery. The only course left open to Devlin would be to refer the Bennetts to a psychiatric hospital for treatment, where the waiting list might not stretch for longer than a few minutes and where, if they

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elected to risk the outpatient department, they would be lucky not to be robbed of their medication on the way out. In short, he could not help them at all, beyond going through the motions.

But when Devlin had left Tommy's bedroom, Bennett was still being absently polite and asking no help. Brother Howard and Devlin both finally asked if there was anything they could do and Bennett made it evident that he simply wanted them to go away.

Devlin caught the Brother's eye and said, "Can I give you a lift anywhere?"

"That is very kind of you, Doctor," said the other and they began a brief conversational disengagement.

WHEN they were on the street Brother Howard said quietly, "Mr. Bennett probably wants to curse or cry or break things or, more probably, try to console his wife. He could not do any of those things with us there. So I really don't need a lift, Doctor. I live only a few miles away and at this time of day unaccompanied pedestrians are in very little danger."

"I have to divert anyway," said Devlin, "and there are no other urgent calls."

He held open the door on the passenger's side, then walked around the car checking for tire damage or the attachment of foreign and possibly explosive objects. Then he climbed in himself. But for a long time he made no move toward starting the car, nor did he speak.

"Perhaps," said Brother Howard, when the silence had begun to drag, "you would like to break a few things yourself, Doctor?"

He did not sound impatient at the delay, just sympathetic and angry.

Devlin did not reply.

When the other man spoke again the anger was under control so that only the sympathy showed in his voice. He said, "Perhaps you would like to ask questions, then? A great, sweeping question like: 'Why?' Or a more detailed one like: 'Why did a young boy like Tommy Bennett have to be killed?' Or perhaps you are the kind who asks questions like: 'Why is the human race, which has reached an undreamed-of peak of scientific achievement and personal affluence, with more than enough leisure for cultural and philosophical advancement to catch up with those material achievements—why is it trying to tear itself apart?' Or maybe you would like to ask the God whom you don't believe in what He thinks He's playing at?"

Angrily Devlin started the car and moved slowly through the Bennett security gate before he said, "Perhaps you would like to answer the questions I haven't asked. Or maybe you are looking for the answers to some of them yourself?"

He could feel the other's eyes on him while he stared into the driving periscope. Then the Brother said aridly, "Well diagnosed, Doctor."

They drove for several minutes in silence, with Devlin beginning to feel more and more ashamed of himself. The other man had been trying to help him, applying a little practical psychology by inviting him to blow off steam. The procedure was sound and the other was expert in prac-

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ticing it—and Devlin, of all people, should have realized that even an expert can be vulnerable.

"I'm sorry," he said suddenly. "I don't know why the human race seems bent on individual and collective suicide when, as everyone agrees, we never had it so good. And I'm sorry that I don't share your belief that this is all a transition stage, an unpleasant wait or training period for something better. But if you wouldn't mind my asking a personal question, what made you become a soul-saver? Why not a socio-technician, psychologist or even a medic? Those jobs usually attract the, well—"

"The do-gooders?" supplied Brother Howard. "The sheep who want to do something useful but are too yellow to wear a belt while doing it?. There is no need to spare my feelings, Doctor, because you are in the same category. But why, when you were in a position to do the most good for the greatest number of people, did you leave a respectable, secure job in a big hospital to take a block practice?'

Bennett must have been talking about me, Devlin thought.

He said, "I suppose it was because I was processing up to two hundred patients a day—mostly major reconstructions following car accidents—and I couldn't remember a single one of them by bedtime. I was even losing the inclination to check with Recuperation to see if any of them had survived. Too, when I came across a patient who was wandering around, lost in a maze of hospital red tape, I got angry at him for his stupidity, regardless of how serious his injuries were. I was beginning to think like a clerk. And if you want to know why I became a medic in the first place," Devlin went on, "it was because my father told me at a very early age that death and injury would always be with us and that the people who helped alleviate it would always have work to do and a measure of respect no matter what kind of insane society evolved in the future."

"That was very good advice," said Brother Howard, then went on: "I trained for a job that I wanted to do very much—I was sure that I would be happy in it. But the job became more complicated, difficult and normally disturbing than I had anticipated. I won't go into all the details now, if you don't mind."

Devlin nodded. "We have something in common, then—we were both looking for job satisfaction. Or maybe we are merely being selfish in looking for the gratitude and respect of individuals—seeking personal gratification—instead of the impersonal thanks of the many."

"Do you want an argument?" asked the Brother.

"Yes, please," said Devlin.

"Sorry," said Brother Howard. "I'm inclined to agree with you, Doctor. We may well be selfish while practicing altruism. But we are helping things, not making them worse."

"Nothing can make them worse," said Devlin.

SOMETHING whanged off the side of the car at that moment—a stone or a spent bullet from some-

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where. When the noise was not repeated Devlin began to relax again.

"Why can't it get worse, Doctor?" asked the Brother. "I'd like to know why you said what you did."

Devlin took a deep breath. "I hope this isn't a lead-in to a conversion pitch, Reverend. Nothing personal, you understand, but I hate to see wasted effort. But to answer your question, I don't think things can get worse, or much worse, because we have never had it so good and, at the same time, we have never been so universally unhappy. People are bored. Instead of building they are tearing down—even though they themselves know that it is stupid to do so. And there are pressures of all kinds building up in them, both individually and as social groups. You can't tell people to do things any more—they react, push away from you and each other. They want a change, or they want out, or they don't know what they want except that it isn't—this. One of these years the pressure will be too much and there will be a great, sick, soggy explosion that will take out even the sensible, responsible kind who are trying their best to run things at present.

"The way I see it," said Devlin seriously, "we have reached the peak of our cultural and scientific potential. It's as if we were a great overripe fruit. We started as a pretty sour and green culture, prone to war and disease and social injustices. Gradually we grew in intelligence and self-awareness and empathy and personal freedom. The growth continued with society becoming richer, more colorful, sweeter and softer in every way. Now we are ripe."

"And?" asked the Brother.

"After ripening," said Devlin, "fruit rots."

"And you hope for nothing after that?"

"Oh, I'm stupid enough to go on hoping."

"For what?" pressed Brother Howard.

Devlin was silent for a moment, trying to find words that would not make him sound ridiculous. Then he replied, "We are a big, overripe fruit under increasing pressure. Maybe, before we fall completely apart, pressure will squeeze out a pip."

Brother Howard gave a strained laugh and said, "A good analogy, Doctor."

The laugh and the tone sounded so odd that Devlin glanced away from his periscope. When he looked back into it he saw a car nosing out of a side street on a collision course. He braked hard, skidded, but stopped broadside-on to the other car without hitting it. A large fat man wearing a belt got out of the car. Devlin muttered under his breath and prepared to do some serious apologizing.

"This was my fault, Doctor," said Brother Howard, climbing out on the other side. "I distracted you."

THEY stood together for several minutes while the other driver told them what he thought of their stupidity in not looking where they were going. If they had been wearing gunbelts the other driver would have been in the wrong but, as things were, sheep were never in the right.

Devlin was used to this kind of

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thing and so, no doubt, was Brother Howard. No actual damage had been done and it was highly probable that the tongue-lashing would not last for very long because a line of vehicles was beginning to form. He amused himself by counting the number of times the fat man repeated himself and wondering if the overly tight belt were upsetting his digestion.

But a small crowd had gathered. It included a boy of fourteen or fifteen who was also wearing a gunbelt, and it was plain that the things the fat man was saying to the two sheep, or at least to the Brother, were beginning to embarrass the young citizen—so much so that he was about to join in.

Brother Howard had noticed the boy as well, Devlin saw, and seemed to be just as anxious as Devlin was not to be the cause of an affair. The Brother stepped forward and held up his hand.

"Don't you dare interrupt me, you stupid sheep," said the fat man furiously. "Your profession will save your life but not your honor, if you ever had any. A sheep like you should be—"

"I prefer," said Brother Howard quietly, "to be called a shepherd. In any case, the condition of sheep is a temporary one that can be ended at any time for any desired period of time." He swung around and walked to the boy. Very politely and correctly he said, "Pardon, Citizen. I would be obliged if you would lend me your belt."

"But Reverend—" began the boy.

"I would be obliged if you would retain your weapon, Citizen, and lend me your belt."

The fat man had paled when the Brother had turned wolf suddenly, and Devlin realized that he had probably been greatly relieved when two sheep had climbed out of the car a few minutes earlier. If a full, belt-wearing Citizen had been driving it there might have been an affair on the spot, with the possibility of the fat man being killed—though he might have publicly accepted all blame for the near-accident. But relief had made him vicious rather than gracious—and now that he would have the double relief of shooting at a suicidal maniac, Devlin doubted that he would be satisfied with inflicting a token wound.

"Excuse me, Citizen," said Devlin desperately to the fat man. "My friend has had a very severe mental shock. A young boy who—"

"IT IS my considered opinion—" Brother Howard, joining them again, his hands hanging very still below his empty, borrowed belt, addressed the fat man—"that you are self-indulgent in food and alcohol, vastly overweight, completely lacking in manners and the worst driver I have ever seen. If you wish to dispute this opinion, be prepared to defend yourself."

For an instant Devlin entertained a wild hope that the fat man would pass out from a cerebral hemorrhage before he was able to draw—his face had gone an improbable plum color. But no. Devlin clearly saw him begin to draw. Less distinctly he saw the gun wrist and nose of the fat man broken, not necessarily in that order, by the blunt edges of two flesh-

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colored blades that had been the Brother's hands. Clearly, because it was the last and slowest blow, he saw a set of stiffened fingers sink into the fat diaphragm—a blow that would have been fatal but for the thick layer of adipose in the area.

Devlin brought a litter from his car and made the fat man as comfortable as possible while the Brother returned the boy's belt. Judging from the conversation, he had gained a convert as well as a hero-worshiper. But when they were moving again Brother Howard looked depressed.

"There is no permanent damage, Brother," said Devlin reassuringly, "but he will need hospital treatment."

"I know, Doctor,' said the other apologetically. "But it will put you to considerable inconvenience—and I am ashamed to say that I took sinful pleasure from that incident."

"No comment," said Devlin.

"You're very kind, Doctor," said the Brother. "Oh, you can drop me here, please. And maybe we can meet again soon and continue our discussion. I mean that—I'm not just being polite."

"You're an interesting man to know, Reverend," said Devlin. "But you still won't make a convert."

"Maybe I'm only looking for recruits," said the other airily.

"There's a difference?"

"There's a big difference," said the Brother as he slammed the hatch.

The name he had known in the casualty department of Sanator Five had recently transferred to another hospital so that it was long after dark before he could untangle himself from the red tape. Devlin could recall every minute of the ride home, during which every vidge on the way seemed to take a shot or throw a piece of homemade nastiness at him. By the time he had freshened up and gone down to the Yellow area of the rec hall, the pre-midnight activity level had reached the noisy and nasty stage, with nonaffair brawls breaking out all over. The girl and her parents were occupying a four-piece table but were about to leave.

Although he could not apologize directly for his late arrival—that would have implied that two Citizens and their daughter had been awaiting the pleasure of a sheep—the atmosphere thawed considerably when he mentioned the incident that had delayed him. They stayed talking about nothing in particular for about half an hour. They called him Devlin, of course, because he was off-duty and not a full citizen, but otherwise they were friendly and easy to talk to. The girl's father had vidge duty from midnight, however, and wanted to see the others secure before he left for the roof.

Devlin wanted to say that he would look after his daughter for an hour or so and see her safely to her home flat, but that would have embarrassed them. A man without a belt was not considered capable of looking after anyone in this situation and they would have been forced to tell him so.

He remembered the look of concern in her eyes as they rose to go—and every wrinkle in every strip of tape that held the incongruous dressing to the damaged side of the otherwise lovely face. Especially he remembered her voice as she said,

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"We may see you tomorrow night, if you happen to be here then."

Devlin had nodded, making a mighty resolution to be nowhere else.

She had said, "Good night, Devlin."

The display was saying:

COOLDOWN IMMINENT. GOOD NIGHT DEVLIN.

VII

From the time he became aware of himself in relation to the others around him he knew that he was different. He had been scrawny and malformed from birth, and his condition had not been helped by minimal food intake during the early months of his life. Every feeding time had been a battle with siblings stronger than he for a place at their mother, who did not seem to care whether he had enough or not. It had been a long and unhappy childhood completely without warmth or affection or security and his even longer approach to maturity was a period of unallayed misery.

The other tribes and large family groups occupying the forest drove him away because he was a stranger. His own people tolerated his presence because he had the right tribe smell, but otherwise would have nothing to do with him.

Unlike them, he was not good in the trees. He did not have the stamina for a rapid, sustained climb to safety when the predators of the forest floor tore at the lower branches. He grew cautious and was always alert for the approach of the carnivores, so as to have more time to climb to safety. As the days passed he was able to watch the quick, happy, overconfident ones being smashed against the tree-trunks by enormous paws, or the ones with the long, sleek fur shaken from ill-chosen branches to be ripped apart before they could hit the ground.

For some reason the predators had become more than usually active in that area of forest and the number of males in his tribe was diminishing. Like himself, the females were more cautious and tended to survive these attacks.

But the days passed and he grew as strong as he would ever be and the tribe was strutting and squabbling and grappling its way through the mating season. Over the long, unhappy years he had learned that for him to take part was to risk serious injury or death—even in a group seriously depleted in males, he was tolerated but not wanted. He thought about it seriously and decided that he did not want to be injured or to die. Then a female recently made mateless passed within a few feet of him . . .

She screeched and fought and tried to get away from him at first. He felt the painful nipping of her teeth and the

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long scratches she left on his face and almost hairless body. But the pain stimuli was swamped by the roaring flood of raw, mindless instinct that drove him at the female. He knew that they were making too much noise and they were attracting the attention of their tribe and probably that of nearby carnivores, but his fear was insubstantial as the pain of the scratches and bites, because now the urge to join and mate had triggered off a response in the female and she was no longer fighting.

Caught in the biological trap and shaken by diminishing explosions of sensation, he became aware that he was still being attacked. Fear and pain returned as the female left him and he realized that virtually the whole tribe was surrounding him, struggling for a chance to scratch and bite his body. He struggled frantically to escape, but the angry circle was always there, nipping and scratching and pulling him down when he tried to climb. They were herbivores lacking the physical equipment to inflict killing wounds, but they had hate and persistence and numbers enough to kill one of their fellows if it became necessary.

Apparently it was necessary to kill him for the present and future good of the tribe—an instinctive attempt to avoid the possibility of other scrawny weaklings being born to them—and they would do it no matter how long it took them.

But suddenly the attack stopped. He lay quivering with pain from the tight lacework of bites and tears that covers his body, unable to see the damage because his eyes had been lost early in the attack. Then the explanation came as something large and heavy flattened the undergrowth beside him. The predator, unlike the members of his tribe, did have the natural weapons to kill effortlessly and efficiently.

A darkness which was not of his blinded eyes descended with merciful speed and the cold was invading every molecule of his being . . .

UNTIL the cubicle heaters drove it back.

GOOD MORNING DEVLIN. SHIP STATUS FOUR HUNDRED AND SIXTY-TWO YEARS INTO MISSION, SHIP PERSONNEL CURRENTLY AWAKE—ONE. IDENTITY JOHN DEVLIN.

"Wait. Wait a minute," said Devlin through chattering teeth. "There's something wrong—let me think, damn you!"

REASONS FOR AWAKENING. OVERALL HUMAN GUIDANCE REQUIRED DURING FORTHCOMING FLY-BY. TO CHECK FUNCTIONING OF DEVLIN MUSCLE SYSTEMS, CIRCULATION, SPEECH ORGAN AND MEMORY.

The idea that had been trying to reach the surface of his mind sank again without a trace. *Overall human guidance required*—that sounded serious.

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PERIOD OF AWAKENING INDEFINITE. FOOD INTAKE PERMITTED SUBJECT TO WASTE ELIMINATION PROCEDURE BEFORE COOLDOWN.

"Get on with it," said Devlin irritably. The display kept telling him the same thing after each awakening—in case of memory impairment, no doubt. But if anything, the cold sleep seemed to be sharpening his memory rather than dulling it.

PRESENCE IN CONTROL CENTER REQUIRED IN ONE HOUR. THIS PERIOD TO BE SPENT CHECKING PHYSICAL AND MENTAL FUNCTIONS. CARRY OUT INSTRUCTION EXERCISE AND REMEMBER.

He surprised himself by being able to ignore his anxiety over the nature of the ship emergency and by recalling several incidents from his seventh birthday. They were sharp and clear because it had been his last happy birthday, and for that reason he usually tried not to remember it. But as he moved through the preliminary physical exercises his mind kept jumping all over the place, from his latest dream to his recent past in the training center, back to the brontosaurus sequence, to Tommy Bennett and Brother Howard and the girl in Blue 31. Each time his mind jumped the person or incident flashed up bright and clear—like lights in a pinball machine. He could see and feel every sensory impression associated with it and he knew that if need be he could concentrate his mind and expand on any of the incidents until he had a complete sequence, equally sharp and clear in every respect.

"There's something wrong," he said again.

Memories, or memories of dreams, should not be as sharp and clear as that. Loss of mental ability was thought to be the greatest single danger, he had been told, threatening the success of the voyage. But Devlin's memory and presumably his ability to think, were not impaired after four centuries in cold sleep—the exact opposite was happening, in fact. His memories were gaining a clarity usually associated with hallucinatory and sensation-heightening drugs, and his dreams . . .

He did not think that he could take any more such dreams. The last one had been so vivid that he sweated just thinking about it and the creatures inhabiting it had been completely unfamiliar to him. He doubted that they were pre-men or even pre-monkeys and the predators had been shaggy and shapeless to his terrified eyes and could have been descended from anything. He had certainly not read about anything like them.

And the dead girl in Blue 31 had read nothing about dinosaurs.

From the moment he had been forced to watch her die, Devlin had tried to forget the incident. But now, for some reason, it was becoming impossible for him to forget anything. Suddenly he was back in Blue 31, hearing her talking and seeing her die from a combination of galloping gangrene and massive thrombosis—and feeling all the emotions he at that time had tried so hard to suppress.

Her last dream had been of being a female dinosaur and her last thought of her Brian. She must have known Brian very well and she had known

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nothing at all about dinosaurs—she had deliberately avoided reading about them. Why, then, had she dreamed about them and—not about her Brian?

Why had Devlin, not even once, dreamed of his Patricia?

Is everyone on the ship having the same dreams?

He stopped exercising, his breath making an intermittent fog around his head while he sought a way through the even thicker haze of speculation that filled his brain. If everyone were having the same dreams—and that could be checked by awakening a statistically meaningful number of the others and questioning them—then the dream material had been artificially produced despite everything they had been told during training.

They had been told that the ship could not carry enough direct mental stimulators and recordings to keep their minds occupied during the centuries-long voyage. But would that still apply if only one set of recordings were being used for everyone? And what about the memory-sharpening effect he had noticed recently? That suggested the use of hallucinatory drugs. And was he really undergoing cold sleep for hundreds of years at a time just because a computer display told him so?

Was he, perhaps, still under training? Was this frigid, silent structure all around him in Earth orbit and were his reactions, along with everyone else's, being continually observed and monitored?

"If you must question," Brother Howard had told him on one occasion, "question everything."

DEVLIN was still asking questions of himself when he took one of the control positions an hour later.

SITUATION REPORT. SHIP IS CLOSING TARGET SYSTEM FIVE. OTHER SYSTEMS NOT SUITABLE FOR SEEDING AND BYPASSED WITH THE EXCEPTION OF PASS THREE AUTHORIZED BY JOHN DEVLIN.

LONG-RANGE SCAN INDICATES TARGET FIVE MARGINALLY SUITABLE FOR HUMAN COLONIZATION DUE TO HIGH BUT NONLETHAL LEVELS OF TOXIC ELEMENTS IN THE PLANETARY ATMOSPHERE. SURFACE GRAVITY ONE POINT ZERO FIVE EARTH NORMAL. ANALYSIS OF RADIATION PATTERNS INDICATES PRESENCE OF INTELLIGENT LIFE FORM POSSESSING NUCLEAR TECHNOLOGY. COMPUTER DECISION TAKEN TO LAUNCH HIGH VELOCITY PROBE FOR CLOSER INVESTIGATION. COMPUTER DECISION TAKEN TO AWAKEN CREW MEMBER DEVLIN FOR OBSERVATION AND EVALUATION OF DATA.

"I should damn well hope so," said Devlin, relieved. "But thanks, anyway."

CLOSE-RANGE PROBE SCAN OF SYSTEM AND PLANETARY SATELLITES CONFIRM PRESENCE OF INTELLIGENT LIFE FORM POSSESSING ADVANCED SPACETRAVEL CAPABILITY. PROBE SOFT-LANDED SUCCESSFULLY. PROBE DETECTED, IMMOBILIZED AND RETAINED FOR INVESTIGATION BY NATIVE LIFE FORM. PROBE NO LONGER TRANSMITTING.

PROBE DATA AND EVALUATION OF MOST RECENT OBSERVATIONS OF SPACE ACTIVITY AROUND OUTER PLANETARY SATELLITES INDICATE

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THAT LIFE FORM IS EXTREMELY HOSTILE.

"Bypass, stupid," said Devlin. "What's the problem?"

THREE SPACE VEHICLES CLOSING ON COLLISION COURSE HIGH ACCELERATION, RELATIVELY SMALL SIZE AND PRESENCE OF UNSHIELDED RADIATION IN NOSE CONE AREAS INDICATES OBJECTS CONTAIN NUCLEAR WARHEADS.

OVERALL HUMAN GUIDANCE REQUIRED.

Devlin stared at the words on the display screen, felt the sweat pop on his hands, forehead and at the base of his spine. It was probably a test. Almost certainly it was a test. But *was* it a test?

There might be no danger at all. Their ship, possibly the last hope of a race stewing in its own physical and psychological effluent, might not be about to be torn into its component atoms by an alien nuclear device. Probably it was nothing more than a near-perfect simulation.

But he kept remembering Yvonne Caldwell, the girl in Blue 31. Her death had been a too-perfect simulation. If he really were being tested and he made a mistake, like the stupid accident in the girl's cubicle, it could well be a test to destruction.

VIII

ALTHOUGH its home world had been plentifully equipped with highly sophisticated and dirigible forms of nastiness, the ship had been deliberately designed and built without any form of offensive or defensive armament.

The idea had been that in the highly unlikely event of a meeting in space with an extra-terrestrial race possessing a technology equal to or greater than that of Earth, friction was unlikely to occur. Any race that achieved interstellar flight and possessed the background of social and scientific cooperation such a high level of technology implied should be civilized in every sense of the word. Such a race would not, the ship's designers and psychologists had been sure, be expected to react with hostility toward strangers simply because they were strange. The computer had other ideas.

FIRST VEHICLE ORBIT INTERSECTION THREE HOURS FIFTY-THREE MINUTES. SECOND VEHICLE THREE HOURS FIFTY-SIX MINUTES. THIRD VEHICLE THREE HOURS FIFTY-NINE MINUTES.

Devlin rubbed his palms against his coveralls and wondered if the ship and project designers had made any other fundamental errors—though this error could make the others irrelevant.

Do I need help?

Awakenings, except for reasons of the direst emergency, were forbidden. Ship consumables were strictly limited so that periods of awakening were kept as short as possible. Loneliness, however, and/or a need for human conversation or contact, were not considered to be emergencies. In a voyage which had lasted over four centuries, Devlin had spent less than four days of biological time in the ship. As a result his memory of the final briefing was only four days old despite all the dream lifetimes that had occurred since then.

Especially sharp was the memory

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of the instructions regarding emergency procedures.

"... We can conceive of no emergency that would require more than one person to be awake at a time. Your ship is self-guiding and its systems either are self-repairing or possess multiple backups, so that awakenings should be for exercise, observation and, of course, decision on the suitability of the target planet before deceleration is applied.

"If awakened for any other reason," the instructor had gone on, "it will be up to the individual concerned to decide whether or not he needs additional human assistance. But to avoid situations where, say, a crew member wakes others for moral support, or to try to pass responsibility for solving a tricky problem to one of the colonists, who will be less qualified than himself to handle it, we have made it the rule that the first crew member to be awakened is deemed to be the senior during the emergency.

"If absolutely necessary he can call on additional human assistance or advice," the instructor had added, "but he cannot transfer responsibility to another. Ideally he should take the decision himself and save on the consumables."

THE display was reminding Devlin that dire emergencies would occur in three hours forty-seven, fifty and fifty-three minutes' time. He decided to sweat it out alone for a while, rather than wake Patricia or some of the others to watch him do it. He requested the data obtained by the probe before it stopped communicating and a fast rerun of transmitted visual material up until that time.

Like the Earth, which his memory insisted he had left only four days ago, this planet was habitable, densely inhabited, but not really suitable for human or any other kind of intelligent habitation.

Even the world's two airless moons, which had never been capable of sustaining any form of life, were covered with city-sized blisters filled to bursting with beings who had exchanged their larger and more crowded planetary prison for ones that were smaller but offered fractionally more living space.

He had thought that the Earth had been polluted; but it had been like an eighteenth century garden compared with the visual data sent back by the probe. Nothing lived on the planetary surface. Nothing moved on the land or sea except robots that tended vast, inland lakes of waste or tracts of bright, artificial greenery protected by domes whose natural sunlight, because of the stinking and nearly opaque atmosphere, had to be augmented by massed batteries of artificial lighting. Hundreds of other dome cities floated on or under the turgid oceans, which were also covered by vast carpets of greenery. There was evidence of robot activity around areas of sickly yellow or brown, presumably diseased sections undergoing cure or destruction.

Not unexpectedly, the natives of this world looked like something that had crawled from underneath a damp rock.

Steady, thought Devlin, *your xenophobia is showing . . .*

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He had many chances to see the natives in action as, covered by opaque protective suits, they retrieved the probe from the planetary surface, subjected it to elevated temperatures and a variety of what were presumably antibacteria sprays and, finally, transported it to a subsurface laboratory staffed by beings whose physical charms were no longer concealed by protective apparel.

If they had had tentacles or pincers or antennae he would not have felt so badly about them, but they were so nearly human in shape that they made him want to be sick.

Their narrow cylindrical heads were joined to the chest by a flexible neck of the same diameter as the head, which was hairless and seemed to have much more skin than it really needed. Among the loose folds and creasings of skin were the fleshy gashes of eating or breathing orifices, a couple of flowerlike protuberances that were probably ears and, set on top of the head, two large yellowish blisters that could only be eyes. The shoulders and chest were uniformly rounded and from the waist the creatures spread out like giant, wrinkled pears balanced on two short legs fringed with misshapen toes or atrophied tentacles. The arms were long and thin, sprouting from just above waist level, and were jointed at elbows and wrists. Beyond the wrist the limbs were multi-brachiate, with three distinct groups of fingers evolved for rough, medium or very delicate work.

Their skins were pallid and greasy and partly covered by small patches of color that might have been dress or badges of rank. The placement of their eyes made them incline their heads toward each other when communicating, giving the impression of aggressiveness. The sounds Devlin caught were like the gobblings of turkeys.

The probe's vision pickup showed one of the aliens gobbling and waving its arms at three others who looked and sounded much less agitated—or perhaps they were the first creature's subordinates and were merely being attentive.

Suddenly one of them held up an arm level with its face and gave it a peculiar, whiplike jerk. All the groups of fingers made small, crackling sounds like a body falling into dry underbrush. An absolute silence ensued and lasted for minutes—then the voluble one reached toward the vision pickup and the picture died.

Devlin stared at the blank display, aware that he had been jumping to conclusions. The agitated one probably had not been the boss, but a subordinate who could have been arguing with its superiors for a course of action that had been overruled—perhaps it had wanted to maintain the vision channel with a view to establishing communications and its chief had been worried about security. Devlin tapped for a slow-motion rerun of the final ten minutes, studying not only the four beings but the items of equipment within visual range.

HE COULD make nothing of the equipment and all four aliens looked exactly the same to him—but

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he discovered another conclusion to jump away from. The soft, fleshy heads were not heads at all but simply a flexible platform for the beings' main sensory organs. The head was the rounded structure he had mistaken for a chest and the arms grew from the shoulder area and not the waist. The creatures were really unhuman and the realization made him, for some odd reason, feel much better disposed toward them.

But they still had launched three nuclear missiles against the ship.

Cursing, Devlin cleared the display of slow-moving aliens and their distorted, low-key gobblings. In all probability the probe had been dismantled by now and was no longer capable of responding to signals from the ship. Nevertheless, he would have liked to communicate with these aliens, even though their world was too overcrowded to be of any use as a colony site. However briefly, Devlin would have liked to talk instead of fighting with them.

Especially as I have nothing to fight them with . . .

His palms were sweating again as he tapped:

WHAT CAN WE USE AS A WEAPON? PLEASE CLARIFY.

"You stupid computer," raged Devlin. "You know what I want—"

But did it? The ship was unarmed and, while its computer was capable of recognizing a threat in the shape of oncoming missiles, it had no programed instructions for turning its ploughshare power sources and equipment into the sword type.

Should he take it upon himself to wake someone?

Devlin shook his head angrily. He had to think. Could anyone on board do it better? Carefully he tapped:

LIST ALL POWER SOURCES AVAILABLE WITHIN THE SHIP. LIST SYSTEMS NOT DIRECTLY CONNECTED TO LIFE-SUPPORT WITH POWER AVAILABLE.

But before the display could react he hit the Cancel button. He would be stupid to waste time watching the computer talking with the ship in great and probably useless detail.

He tried again:

LIST POWER SOURCES AND SYSTEMS WITH LONG-RANGE EFFECTS. OMIT COMMUNICATION SYSTEMS.

PLEASE CLARIFY.

Devlin took a deep breath and exhaled it slowly. The computer, he reminded himself, could give only the answers it had been programed to give, and then only when the questions were properly phrased.

He tapped:

LIST SYSTEMS FOR PREVENTION OF ACCIDENTAL DAMAGE OR INJURY TO VESSELS OR PERSONNEL MAKING A CLOSE APPROACH TO THE SHIP SHORTLY BEFORE ACTIVATION OF DRIVE.

PLEASE CLARIFY SHORTLY.

MINUS THREE MINUTES.

BROADCAST WARNINGS ON SHUTTLE FREQUENCIES ORDERING VEHICLES AND PERSONNEL CLEAR OF FLIGHTPATH AND BEYOND FIVE MILE RADIUS OF SHIP. WARNING LIGHTS MOUNTED FORE, AFT AND AT FIFTY-YARD INTERVALS AROUND THE HULL. FLASHING LIGHTS ON SECONDARY DRIVE REACTOR ORIFICE. FLUORESCENT PAINT IN AREAS WHERE STRUCTURAL PROJECTIONS ENDANGER SPACESUITS . . .

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Devlin turned his face away from the display, fighting despair. He had had a vague idea of finding out ways in which the ship could be dangerous to objects or people approaching it by discovering the safety devices and systems and then switching them off. But as the list of safety measures lengthened it became more and more obvious that the greatest danger to an object in the vicinity would be if the ship rammed it. He turned back to the display and reached for the Cancel button, then stopped.

. . . IN THE EVENT OF A MAXIMUM THRUST TEST OF THE SECONDARY DRIVE TO SIMULATE AN ABORTED LANDING, VESSELS AND PERSONNEL ARE WARNED TO REMAIN BEYOND A MINIMUM DISTANCE OF FIVE MILES ASTERN. RADIATION HAZARD SIGNALS ARE BROADCAST ON ALL SHUTTLE FREQUENCIES FLASHING LIGHTS ON SECONDARY DRIVE REACTOR ORIFICE ARE . . .

HE HAD almost forgotten about the secondary drive, which was needed only during the final approach and landing. It was a relatively unsophisticated piece of equipment using a nuclear reactor and water as fuel, but anything that got in the way of the jet would become severely overheated and, in the case of a dirigible missile, its control and guidance systems would be disrupted by a concentrated beam of ions and its warhead might very well go prematurely critical.

Directing the drive at three missiles in turn while they were within effective range would call for some fancy maneuvering on the part of the computer, for beyond a distance of five miles the secondary drive jet would be something less than a hazard.

Devlin eagerly called up the relevant figures, then slumped back in his couch.

The fantastically high closing speed of ship and missiles was such that only a few seconds could be allocated to dealing with each of them between the times needed for changes of attitude. That was scarcely enough time to warm their metallic hides, much less detonate them a safe distance from the ship.

He had to face the fact that the ship could not fight. But could it evade? Devlin began tapping again, trying to find out exactly what the ship had in the way of legs to run with.

There was the main drive, which had provided the gentle and continuous acceleration to achieve one-quarter lightspeed. It had been shut down pending discovery of a suitable planet, when they would use it again to decelerate and return. The secondary drive, whose legs, were designed for sprinting rather than marathon running, delivered three Gs during final approach and landing.

According to the computer, the missiles had been launched from a satellite of the alien home planet nearly three months earlier. Devlin did not know exactly how advanced the aliens' equipment was, but he assumed that the ship had been detected and its course through the system plotted anything up to a year earlier. The missiles had been launched on an intersecting course but, like the ship, were no longer

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under acceleration. Perhaps they were nothing more than large, sophisticated bullets, incapable of further trajectory modification. In which case he could duck, with a very good chance of avoiding trouble—and the sooner he ducked the better his chances would be.

He strapped himself more securely to the couch and, without giving himself a chance to have second thoughts, requested three minutes of three-G thrust on the secondary drive at right angles to the present course. Theoretically the evasive action would have been equally effective if he had accelerated toward the missiles, or even decelerated and allowed them to pass ahead of him, but psychologically it was more comforting to turn away from the attack and the people who had launched it—especially when the display was showing graphically the narrow margin by which the ship would avoid disaster.

According to the display, the missiles would pass within fifty to sixty miles, unless their courses were modified. Should the aliens be capable of this, the display gave the times involved—a little over six minutes for the ship's change of course to become apparent to the attackers, an unknown number of seconds or minutes for the aliens to react and recompute trajectories and just under three minutes for their radio signals to go out to the missiles.

Devlin watched the display anxiously.

MISSILE ONE MISS DISTANCE FIFTY-SIX POINT THREE MILES. MISSILE TWO MISS DISTANCE FIFTY-ONE POINT SEVEN MILES. MISSILE THREE COURSE CORRECTION INITIATED. MISSILE THREE ON COLLISION COURSE. ESTIMATING CONTACT TWO HOURS FIFTY-SEVEN POINT EIGHT MINUTES.

Devlin swore. The missiles did carry enough fuel to make course corrections. But only one of them had done so—the one that had been due to strike last and therefore had more time to maneuver. This might be an indication that the aliens' computing facilities were being overstretched, or simply that they were so confident of hitting the ship that they were refusing to waste time by diverting all three missiles.

To give himself time to think he tapped for a replay of the sound and visual material from the probe, and stared at what he thought might be a good alien and the three bad aliens.

HIS first impulse had been to order random attitude changes and periods of thrust, which would give the aliens' control and guidance specialists a lot of work to do and, just possibly, reduce missile three's capacity for maneuvering. But random attitude and course changes would occasionally take the ship toward the missile. He could not afford a near miss because the radiation, although it might not be fatal to everyone on board, would probably injure the people in cold sleep who were positioned below the outer hull. There was also the fact that the computer would have to carry out all the random movements in reverse order if the ship were to regain its original course and reach the next target system.

The ship was moving deeper into

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the alien system as well as closing rapidly with the missiles, which meant that the reaction time of the missiles' guidance experts to ship course changes was also being reduced. But if he could make a drastic course change within that reaction time, using the secondary drive at its full emergency thrust of five Gs, the aliens might assume that the ship was incapable of any greater evasive effort than the three Gs already used and their counter computations, necessarily hurried, might be correspondingly off. Devlin did a few quick calculations and decided that a two-minute five-G burn within the reaction time would pull the ship out of danger.

The computer did not agree.

Devlin found himself fighting back anger and a bout of hysterical laughter as the ship's computer did its best to mutiny. It did not want him to apply five Gs thrust to the ship, it flashed, because this should be done only in the event of an extreme emergency shortly before landing on unsuitable terrain. The ship's systems would be severely overstressed by five Gs. This would not matter if the ship were landing shortly afterward, but it could be dangerous for the occupants if it had to resume the voyage after such a period of maximum stress. The display went on to list the dangers of such an action, detailing the effects on power reserves, life-support systems and long-range sensory equipment. Every time Devlin tried to tap out an instruction he got nothing but warning lights, and the minutes were rushing past.

"Damn you," he said to the side display, which was still showing the four aliens talking and gesticulating in slow motion. "We aren't invading you. We wouldn't touch your stinking overcrowded system with a barge pole—"

But a calmer, more controlled corner of his mind knew that the aliens had a point of view, too. They were simply reacting to the apparent threat by a strange ship storming into their system with intentions they could only guess at. If the positions had been reversed, Earth people would probably have done the same.

He tapped again for emergency acceleration of five Gs and the warnings and precautionary telltales began flashing again. He tapped for four Gs and received no objections at all.

With his finger poised above the Execute button he stopped, canceled and tapped for four point five Gs. Still no objections. He tried edging it up by a few decimal points while extending the period of thrust and the arguments started again. Apparently the computer would cooperate at four point five Gs for three minutes and no higher.

NEARLY two hours were needed to power up the secondary drive reactor and to check its focusing coils. By that time it was obvious that the first two missiles were being allowed to go wide. The third was still on a collision course and closing rapidly. When the ship took evasive action, the time lag needed for the light carrying this information to reach the aliens and for the radio signals bearing the missile's course correction to reach it was just over four minutes. Any dodging would

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have to be done within that time.

He called up a picture of the area of sky from which the missile would come.

The aliens, if they were using their oddly equipped heads, would pretime the missile to explode at the nearest approach. The detonation signal would go out to it at the last possible moment and be based on the latest available course data—which would be less than four minutes out of date.

Precisely four minutes before estimated impact the thrust from the secondary drive rammed him deeply into his couch. There was nothing on the display screen but stars and, in one corner, a distant figure, blurring rapidly through the eight hundreds. One minute, two minutes, three minutes passed and it seemed that the missile's rate of approach was slowing, but not, Devlin was sure, quickly enough. It was not until the distance closed to under one hundred miles that he was able to recognize individual numbers, not until the forties that it showed any signs of slowing, but there were only a few seconds remaining before estimated impact when the figures crept out of the low twenties and into the 'teens. They hesitated at sixteen miles distance, then withdrew to seventeen, eighteen . . .

An intolerably bright point of light appeared near the center of the display screen. By the time Devlin had blinked away the after-image it had become an expanding patch of mist that was almost too diffuse to see. He waited for a shock wave to hit the ship, but the instruments did not even shudder.

"The inverse square law," he said, laughing with relief, "is wonderful."

He felt happy as the ship went through the secondary drive maneuvers that would return it to its original programed course toward the next target system. The near-miss had not—so far as the status displays were concerned—had any ill effects on the ship, its systems or the cold-sleeping colonists. But he also knew a vague uncertainty and a feeling almost of surprise that he had been able to accomplish what he had. True, his memory had recently become much more retentive and the lecture material on computers during training could, perhaps unconsciously, have been available in his mind. Whatever the reason, he had, for a few crucial minutes back there, felt that he knew exactly what he was doing.

At best he was a hero, Devlin thought aridly—and at worst a crew member under observation who had passed a difficult test. Trouble was, he found it difficult to believe that the aliens who had tried to kill him were the product of a simulator. And if he had proven himself a hero, he deserved a pat on the back from someone.

He did not get it from the computer.

COURSE CORRECTIONS COMPLETE. SECONDARY DRIVE REACTOR POWERED DOWN. WARNING. REACTION MASS REMAINING FOR PLANETARY LANDING BELOW MARGIN FOR SAFETY.

If it had been a test, he might not have passed it.

TO BE CONTINUED

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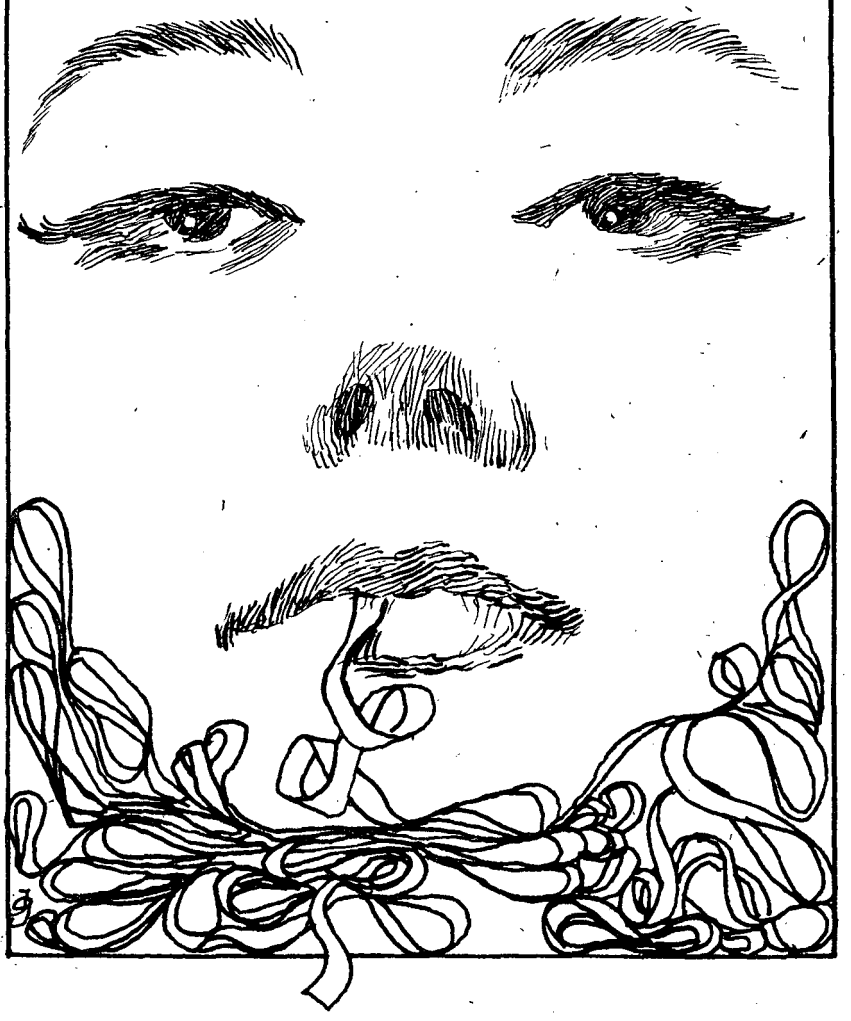
AGNES, ACCENT AND ACCESS

The computer knew the answers
to everything—except Agnes!

THEODORE STURGEON



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IN THE summer of 1978 a wind blew slantwise through the offices of M&H. The phrase was Mr. Miroshi's for he had a touch of poetry about him. What he meant by it was the mildly bizarre, perplexing, and completely unpredictable behavior of the information retrieval sequences. In the course of an ordinary business day one might hardly think it crucial if the computer delivered to the Math section, for example, a medical paper complete with unsettling illustrations, or if Marketing, wanting a survey of New Zealand imports, received instead a treatise on human hostility and aggression. But M&H was no ordinary business, so they called in Merrihew.

Merrihew was no ordinary troubleshooter, either.

Mr. Handel, co-president of M&H, explained to Merrihew about M&H, once they were settled in their booth in a cafe not far from the M&H headquarters. (Merrihew's suggestion, of course; he was not given to charging into situations he did not comprehend.)

"No ordinary business, Mr. Merrihew. We are not a large firm, really. But then Maserati isn't a large firm either, and no one yet produces Yomeimon Gates on a production line. Our methods are, I would say, unusual. I would not," he added modestly, "say unique."

"Your advertising says that for you."

"Ah, then you do know something about us."

Merrihew, whose reputation was that of knowing something about everything, gestured for Mr. Handel to continue. He did: "We are highly diversified and we buy, sell; trade, manufacture, contract, subcontract and produce a great many things in many different ways and places. It is safe to say that each of our activities is successful to a degree—varying, of course—"

"From excellent all the way down to good."

"You are kind, Mr. Merrihew."

"You are successful, that's all."

"Ah." Mr. Handel was pleased. "You do make it difficult to be modest."

"It is only difficult to be modest when it's painful, Mr. Handel, and it's only painful when it's necessary. Please go on."

Mr. Handel raised his eyebrows at this piece of pragmatic philosophy and went on: "Well then, it's no secret that our basic product is office equipment and that our products and services are means to promote that equipment. We try to integrate our approaches completely. That is, the problem dictates its solution, the chosen method of operation is what designs a machine or a component. If you came to us asking if one of our systems would sell oranges, say, or move merchandise or establish a Matto Grosso market or test consumer response equally well in Prague as in Bangkok, why, we would devise the best possible approach to the problem and take that

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one step further—the one that makes us, if I may say so at last, unique. We actually enter the field. We take the risks, we do the work, we find out if the approach is optimum. And if there seems to be a better way we try that too. When that happens, it is frequently the case that a new office machine or method is called for, which is why we say that 'your problems design our equipment.'"

"And how do your customers—prospects—feel about your incursions into their fields? Especially the successful ones?"

"Mr. Merrihew," said Mr. Handel, as if explaining not the phenomena, but the very fact of day-and-night, "they *know* we will withdraw."

Merrihew lifted one eyebrow—somehow a much more potent gesture than the elevation of Mr. Handel's two. "Don't you sometimes find it a little tempting to stay with a nice new fruitful operation?"

"One need not yield to temptation," Mr. Handel said primly. "Our central concern is office systems—and we try hard not to forget it."

"Then you can't lose."

"As long as everything works as it is designed to work."

"Ah," said Merrihew. "Now we come to the problem."

"NOW we come to the problem. For you can see how essential, how absolutely vital, in a small but highly diversified operation such as ours, is the matter of retrieval—immediate, reliable retrieval of the information stored in our banks and available from outside. For not only do our operations depend on retrieval, but each operation, each sequence in each operation, is a demonstration of our systems and is on display. I have my own special nightmare, Mr. Merrihew," said Mr. Handel, running a controlled finger around the back and side of his collar—a small movement, but in this bright, intense little man, a signal of submerged fatigue and terrible tension. "I have this nightmare in which some Very Important Person stands behind Mr. Samm of our Math division and witnesses Samm's request for a certain set of figures—and there is a click from the console and from the slot comes something like this—" From the capacious attache case beside him on the seat he drew a sheaf of papers and slid them across to Merrihew. A typical M&H duplication, with crisp typography and in vivid colors, it was an excessively specific illustrated article entitled *Alternatives to the Posterior Colpotomy.* Under it was another called *Management of Abcesses of the Lower Mandibular Arch.* There was more, and worse. Merrihew lifted the stack, banged the edge of it against the table to align the papers and carefully turned the whole thing face down. His eye fell on his half-empty coffee cup and with an infinitely eloquent gesture he pushed it away from him.

"The nightmare," said Mr. Handel hoarsely, "actually came two-thirds

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true. The only important element missing was the Very Important Person." He informed a discreet shudder and then displayed another many-leaved paper. "*'Hostility and Aggression, A Radical Approach,'*" he read. "This arrived on the desk of our marketing director in response to a request for trade information on the South Island of New Zealand. These, of course, are gross examples. In a way I'm far more worried about the little ones. You can *see* the big ones. I don't have to describe to you the possibilities of one misplaced decimal point, or the inaccurate reporting of a single raw-material supply in some of the more complex projections we get into."

"I get the picture. Now, how often is this happening?"

"That," said Mr. Handel, "is the most troublesome thing of all. I have here a chart of the incidence of these, ah, events—dates, times, locations of demand and points of retrieval—and as much as one can express as to the nature of the, ah, irregularities, and as you can see at a glance, they are about as nearly random as such things could possibly be—in frequency, quality, kind, importance and every other factor."

"And your circuitry—tapes, disks, all that?"

Another thick sheaf joined the growing mound on the table. "That's one area we can practically eliminate," Mr. Handel said with confidence and more than a little pride. "These are M&H installations, naturally, in an M&H environment and maintained and inspected by M&H personnel. We are on display at all times, Mr. Merrihew, through and through. Our weekly maintenance is more thorough than you'd find elsewhere twice a year and our engineers know their jobs. As for the computers and their satellites, most are self-checking and run their own diagnostics periodically. No, Mr. Merrihew, we won't find the trouble there."

"I think you're right. We won't," said Merrihew, with a positiveness that apparently startled the co-president.

"You sound, suddenly, as if you had solved the problem."

"Oh, I have," said Merrihew. He reached for the chart of events and glanced at it again. "It's just that knowing what's wrong isn't enough. I want to know *why*."

"I—don't quite follow you, Mr. Merrihew."

"I know that, Mr. Handel. Now, here's what I want you to do. When I come to see you tomorrow morning, don't let me."

"I—beg your pardon?"

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"Don't get rid of me either. Just stall. All right?"

"Mr. Merrihew, would you mind telling me—"

"I'd mind a lot. Now I have to go think. See you tomorrow, Mr. Handel." He rose and slid out of the booth and added the word: "Ultimately." He left.

Mr. Handel sat where he was, motionless and speechless and for a long moment without even thought, until at length he stirred, picked up his documents—and, of course, the check—and went back to the office.

SUAVE was the word: the room was suave. The lighting was gentle and varied, tasteful and flattering. Sound went where one desired it to go and was swallowed up everywhere else. There was a sense of pleasant disorientation, for the walls, and to a very subtle degree the floor, were not perfectly flat and there was no special place or line where wall became ceiling. In a strange way one seemed not to be indoors at all as much as in another country. Most of the light in the room changed color, but only slightly and with the wonderful gradualness of an aurora, for one does not see the change; one must look away and look back again to be able to know it at all. Yet the light was steady and clear where it should be so—around the wide soft benches and their displays of literature (current magazines, "coffee-table" art books and, nowhere in sight but by no means out of reach, discreetly startling M&H promotions) and equally steady and warm near the two mirrors. Clever touch, that, thought Merrihew.

But no one, on entering the reception room at M&H, could count the instruments of this symphony of subtleties, most especially when Miss Kuhli was at her console.

Miss Kuhli (Merrihew had heard it "Cooley", the day before, and had built quite a different picture) was Eurasian. Not since the perfection of ferro-concrete and its self-stressed freedom has architecture been able to match the construction of such eyelids and supraorbital arches as those with which Miss Kuhli had been born. Her hands seemed to be the cooperative work of a florist and a choreographer. Her body had not been designed, but inspired, and her hair was such that it could not be believed at a single glance. She dressed with the studied spontaneity of the highest possible high fashion, of which Merrihew had once cynically remarked, *If the eardrum ever becomes taboo, high fashion will find a way to give you a glimpse of it.* All of which was quite secondary to Miss Kuhli's voice. Correction. It wasn't solely the voice. It was the instrument and the skill, the genius with which it was played. "Good morning," she said as Merrihew entered, and he all but responded, *Thank you—oh, thank you—* just because she cared to give him all her attention, all her time while she was saying it.

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"Good morning."

"Is there anything I can do for you?" she asked with tastefully controlled eagerness.

Offhand, Merrihew could think of twelve ways to answer that question and was strongly inclined to use all of them. But he said, "I'd like to see Mr. Handel."

Her eyes flicked swiftly to what could only have been an appointment list; but the way she did it could be translated by any wishful visitor as—just possibly—a wink. "I'll see if he's in yet. Your name is—"

"Merrihew."

"Mr. Merrihew!" she said through a warm quick smile. One would think she had been waiting for months for this meeting. "Lois," she said to the holoscreen on her console. "Is Mr. Handel there yet? Mr. Merrihew's here." The way she spoke it Merrihew's name was in a slightly larger type than the rest of the sentence—but discreetly not italicized. The punctuation at the end was something more emphatic than a period but nothing as gross as an exclamation point.

The screen asked if Mr. Merrihew could wait. Merrihew could. He squinted against the flashbulb radiance of Miss Kuhli's smile and went to one of the benches (if it was a bench) against the wall (if it was a wall) where he might best watch the action.

And action there was. Miss Kuhli's console (on which was affixed a polite but monumentally expensive small bronze plate in lower-case italics: *agnes kuhli*) was so placed that it was not a barrier between herself and the world. At the same time it was not exactly included in the waiting room. One might call it a half-surround, a construct of such a nature that it was a convenience for her to occupy it, while clearly the lesser of comforts to anyone else. Seated, she was not concealed, and to a degree shared the space as one might share a living room. Yet her operating point was hers and no one's else.

People came. People went. People waited. Merrihew very soon observed, with a small cynical slap on his own wrist, that Miss Kuhli's eager recognition of strangers and her warm willingness to help had not been for him alone. She surely was among the best in the world at what she did, and this special thing she did better than anyone he had ever seen. But he did indulge himself in a childish moment of regret . . .

SHE was never hurried and never at a loss. It took some time for the casual observer (which Merrihew certainly was not) to realize that reception was a very small part of what she did. Her console was constantly active—soft lights and whispers, little flashings and murmurings, to each of which she responded according to its demand. At times she seemed to sink into a species of meditation—hands clasped on her knee, eyes downcast—and during

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those times it would take a practiced eye as sharp as Merrihew's to divine that she was speaking and that this was no mantric interval—any more than the occasional rhythmic manipulation of the simply designed, glittering little ornament at her throat was meditative.

Therefore, while anyone might walk in and find an extremely restful, beautifully decorated room commanded by a startlingly pretty young woman at ease on a comfortable bench, a young woman who would put him at his ease unhurriedly, share his concerns for a moment, do what needed doing and then apparently retire quietly into her thoughts, there was actually a great deal more going on. In the moments between the ebbs and flows of people—who waited, who left, who delivered, who received, who were directed and ushered, who were greeted by suddenly appearing personnel from inside and led away, and who, twice that morning, included herds of awed children being given a tour through the plant—in these lulls when there was no one there but Merrihew and Agnes Kuhli (and each time she acknowledged this remote intimacy with a charming smile; never for a second did she seem unaware of him) his sharp ears extracted from the miracles of sound-absorbency around her some of the flood of detail she was handling. Flickers and pulses from little lights, quick touches from her long hands on illuminations and patches which could only be electrostatic switches, and the occasional radiance of the holoscreen, each elicited its quick manual or vocal response. Not that her every minute was crowded—far from it. It was in one of the occasional lulls that their eyes met—he saw to that, keeping his gaze fixed on her in peril of drying his eyeballs—and she gave him that incredible, sharing smile and said, "My—he's keeping you here so long—" So caring, so concerned. "Here, I'll just—"

Her fingers flickered on the console and her face was palely lit by the glow from the holoscreen, which was not in his view. "Lois, Mr. Merrihew's been waiting *so* long—"

Lois, as expected, said whatever needed to be said and the glow died. "Something came up," Miss Kuhli commiserated, "and Mr. Handel would like you to wait just a little longer, if you don't mind."

"I DON'T mind," Merrihew said heartily. He rose and approached her. "Miss Kuhli, would you mind very much showing me some of the things that console does? I've been watching you work and—"

"Of course I don't mind!" she cried, this time with a real exclamation point. "That's what I'm here for. What would you like to know?" As she spoke an amber light showed on what seemed to be a solid piece of hand-rubbed walnut. Her hand hovered over it a moment and then stroked it. It disappeared.

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"Well, practically everything," said Merrihew. "What was that, for example?" He pointed to the spot where the amber glow had been.

"Oh, Mr. Stamm isn't going out for lunch and he wants it sent in."

"That little light said all that?"

She tinkled a laugh. "No, *he* did."

"I didn't hear anything."

"Naturally not." She lifted away some of her shining hair and revealed an ear which had obviously been designed by whomever it is that holds the patent on the chambered nautilus. Resting in the orifice was a glittering little gem of a device. There were no wires or brackets or anything else of the kind. "It's my personal receiver. I have one in the other ear too. Sometimes it's nice to hear with both ears but I can use either one—or both on two lines, if I have to."

"Microrange FM," Merrihew deduced.

"Yes! And I answered him the same way." She pointed to the jewel at her throat.

"You spoke to him?"

"Yes, I asked him if he'd like the usual and he said yes and thanked me and I said goodbye."

"All the time you were talking to me?"

"Well—between talking to you."

"Subvocals—is that it?"

"You do know a lot about it!" she said admiringly. Another amber spot showed on the board and she put out her hand. This time she touched the board right under the glow and it turned red. "I put him on 'hold,'" she explained. She waved at the end of the board and the bright numerals of a digital clock appeared (remaining in sight five seconds and then disappearing) and she said "It's Mr. Damiani in Design. He's been waiting all morning for hand delivery of some special components and he'll be wanting to know if they've arrived. I'll tell him no, not yet and I'll send them up the instant they arrive—and shall I call the factory again. Watch."

He leaned closer while she touched the red into amber. She smiled (and he recalled how many ventriloquists maintain a smile the whole time the dummy is talking) and he was aware of the slightest possible murmur of her voice, the barest motion of her lips. Even forewarned, however, he could not distinguish the words. When she had finished he said, meaning it, "That's one of the most amazing things I've ever seen in my life." You also smell wonderful, he added, but not aloud.

"It isn't hard to learn," she said deprecatingly. "I don't suppose it's necessary, either, but you can see how nice it is in an open office like this—no bells and 'scuse-me's and plugs and wires. And it's the best possible demonstration of our new VIP. That's V.I.P.—Voice InPut system."

"What's that?"

"Well, the VIP System, the new M&H Computer Central. We centralize all the office functions—well,

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almost all—into one computer, but it's very special. We have access to it by voice. Some day," she went on with heart-stopping enthusiasm (oh, my, thought Merrihew, it's so easy to listen to this lady without hearing a thing: she is her own diversion, bless her). "we hope to be able to perfect a VIP system with access points all over an office. At this stage it's geared to operate through one person."

"You."

"And two others, with another girl in training," she went on. (The entire time she talked, the board glowed and flashed, her fingers moved, hovered, touched and rested.) "Look." She touched a point in the wall (or whatever it was) at the base of the console, and a drawer slid out. Inside were four small compartments. One was empty. Each of the others held two of the jeweled earsets and one such ornament as the one she wore on her throat. She took out one of these.

"Beautiful," said Merrihew, meaning whatever he meant.

She held up the throat device, meaning that. "There's no reason it shouldn't be. And it really is, inside and out. Really, some of the microcircuits in this thing are as beautiful as anything a jeweler ever turned out. I'll give you some literature on them before you go, if you like."

SHE paused, for the holoscreen lit up. Merrihew could see it now. It was nothing but a film of frosted plastic, perhaps sixteen by twenty inches and a very few sixteenths of an inch thick. At first blush one thought of rear projection, but it was far more than that. It was like looking into a clear cube of glass in which was not the picture of a girl's face, but the girl's face itself. The pleasant blond apparition asked, "Aggie, is Mr. Merrihew still there?"

"That's Mr. Merrihew, looking over my shoulder."

"Oh," said the image, looking straight into his eyes, "Hello! I'm Miss Addamski, Mr. Handel's secretary. I'm so sorry to keep you like this. Truly, Mr. Handel will get to you just as soon as he can."

"That's all right," said Merrihew. "I'm in good hands, as you can plainly see." Miss Addamski smiled and faded away while Miss Kuhli (magnificent woman, he thought) managed to laugh at what he had said without giggling.

"Beautiful holograph."

"Would you believe Mr. Miroshi's not pleased with it yet? He still thinks a lot more can be done with the color rendition."

"It's so much better than the passionate pinks and sick greens I've been used to."

"Oh, thank you. Now, where were we?"

"At the jeweler's, I think."

"Oh, yes." She held up the throat device she had taken from the drawer. "You'll notice that all of them are twelve-sided, with a hole in

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the center. This is what makes it so quick and easy to learn. You think of a clock, you see. You pretend you have a clock or watch on your throat. Now it's easy to locate which of the twelve sides is which number—two o'clock, seven o'clock, and so on. You can use it to dial a telephone number if you want to, for example, just by switching in here—" she touched the board and an amber light glowed—"or the intercom system, or paging, or to retrieve something from the files."

"I understand that everything stays in the M&H files, and what you really get is a copy."

"My! You really do know us. Yes—look, I'll show you." She touched the board, manipulated the jewel at her throat and a ten-by-twelve section of the board became a projection of a business letter. "That's for inspection," she explained, "just to be sure it's the one you want before you reproduce it. If it is, you just . . ." and she touched the board at the right place and in five seconds a sheet of paper emerged from a slot—an exact duplicate of the letter.

"Really amazing. But where does the VIP system come in?"

"Oh, I had to show you the old way first." She beamed. "Would you like to see that letter again, or another?"

"Let's try another one."

At that moment a young man came in with a small package. Almost simultaneously, it seemed, a startlingly pretty young girl emerged from an inner door, took and signed for the package while the young man ogled her and Miss Kuhli, his head moving like that of an aficionado of table tennis, Miss Kuhli the while asking after his sick mother. And while this was going on the image of another letter appeared on the small screen. Miss Kuhli caught Merrihew's nod, touched her control and by the time the young man and the secretary were gone the new letter was in his hands.

"I feel foolish," said Merrihew, "like the audience of a magic act. How did you do that? I mean, when?"

Clearly she was enjoying herself. "Between the time I said hello to him and the time I asked after his mother. While he was handing the package to Sue."

"You never touched your throat mike."

"I used it, though. I switched here—" she showed him—"to activate the VIP, and then I simple told it the code number of the letter I wanted."

"Subvocally."

"Yes, it seemed the best way at the time. But I didn't have to. Oh, Mr. Samm's lunch—unfinished business. I can show you with that. Now, what I must do is call the restaurant. Let's say I don't know the number. I could look it up. Or I could—" she fingered the throat jewel—"call Information. Or I could use VIP. Like this—" and she touched a spot on the board. "VIP, what's the number of

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the Blue Corner Restaurant?"

Before the words were out of her mouth the telephone number appeared in brightline numerals. "But I can do better than that." She canceled her board, keyed VIP, and demanded: "Get me the Blue Corner." Instantly the holoscreen lit up and they were looking at a young man in a blue apron, with all the surprising dimensionality of the M&H holoscreen. "Blue Corner. Oh," said the young man, lighting up much as the screen had done. "Miss Kuhli! How are you, Miss Kuhli?"

"Fine, Ronnie. Ronnie, Mr. Samm's eating in today. Will you send over the usual, a quarter to one?"

Devoutly, Ronnie vowed he would, waited for and got a Kuhli smile and rang off.

"Marvelous," said Merrihew, and could think only to repeat the jaded word. "Marvelous. What you've done here at long last is to perfect the old impossible idea one finds in those silly science fiction stories—the computer you can talk to, the robot that acts on spoken command."

"Mr. Miroshi says we have never perfected anything," said Miss Kuhli, "We merely produce the best. We're really a long way from the computer one can talk to, the way I'm talking to you. And as you see, we still have to acquaint the computer with a certain person—" she touched the jewel at her throat—"before it can be expected to respond reliably. VIP has to know a person's way of phrasing, the diction, the normal vocabulary and what to accept in variations of emphasis. Poor VIP can't spell at all, you know. We still have to write our own letters, but he does make it a lot easier. Let me show you."

SHE brought out her typewriter, an act that consisted of pulling out from the edge of the console a fingerboard no more than half an inch thick and pushing it inward again, which, with a click, made it assume the slight slant of the conventional keyboard and apparently complete rigidity. "It can afford to be as thin as this," she explained. "It's all electrostatic switches. The other parts are all in the computer." She touched the ON point, which lit up, along with the same screen on which he had seen the files. "Now we get some help from VIP," she said. She activated the system and said "Letterhead and date, please."

They appeared on the screen.

"To?"

"Mr. Handel. From me."

"To Mr. Handel, VIP." Neatly, in three lines properly spaced, there appeared on the screen Mr. Handel's name and title, room number, street address and zip code. A triple space and then: Dear Mr. Handel:

"Wow," said Merrihew, impressed yet again. He then began to dictate. Miss Kuhli's fingers flew. In a way it was eerie, for the typewriter made not the slightest sound, and there was no carriage, no paper, nothing

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but the shining words appearing on the screen one by one as he spoke. They were:

I have confirmed, and in a matter of minutes will prove to your satisfaction, that the source of the difficulty we discussed yesterday is in my present location.

No one is perfect, Mr. Handel, and the closest you can get to perfection is, as your partner remarked, to achieve the best there is at any moment. I concede that you have done this.

What I think you have overlooked is that your VIP system is set up for a perfect input. No person is perfect because no person is any one single thing. Mood and pressure can turn one facet or another of a person to the front, despite the determination of that person not to let that happen. How easily it happens depends upon the person, but for everyone there is a point, a degree of pressure, at which the turn will occur and another "person" will present itself. But not *quite* another person, you see. To a computer finely tuned to one individual this must present a perplexing development. It can then only do what any of us do when perplexed—that is, make a good guess.

There is a common denominator in the two documents you showed me—the medical report delivered to your Math section and the treatise on agression and hostility. Unless I am seriously in error—and I am not—Math was looking for a certain regular series of figures, probably daily, in the preparation of a graph of some sort. VIP was asked for "abcissas" and came up with "abcesses." In the other case a request for information on the *antipodes* got a response which concerned *antipathies*. There is only one place in the world where each of these couples is pronounced almost identically, and that is in the part of New York City known as the West Bronx.

"Why—I was born in the West Bronx!" exclaimed Miss Kuhli.

"Think of that," said Merrihew. "Shall we go on?"

They went on.

One of the many facets of the human being capable of being turned to the front under stress is the blind spot, Mr. Handel. The fact that every one of the troublesome events you listed occurred on the same shift, with the same operator, completely escaped you and everyone else who saw the

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list. Doubtless it would have escaped me as well had I met Miss Kuhli before I saw it instead of afterward. As I dictate this it also becomes clear that in spite of the distress this matter has caused you, and the thoroughness of your investigation, no one to this moment has checked with her. No one, least of all Miss Kuhli, would even begin to believe she could do any wrong.

"Now let's hold it right there, Mister," said Agnes Kuhli harshly. "I work hard and I do the best I know how, so what kind of con is this 'do any wrong'?"

"Miss Kuhli," said Merrihew gently, "your West Bronx is showing." She glared at him hotly for a long moment. He held her gaze and radiated as much calm as he could. Merrihew could, when he cared to, radiate a great deal of it. She subsided from fury to sullenness and took her eyes away to scan down the words on the screen. "Never in life," she growled—it was a real growl—"could I get so uptight that I'd make such a stupid—" Her voice trailed off as she fixed her brilliant eyes on a word. "'Antipodes.' Oh. Oh, that was the time he—" Surprisingly, delightfully, she colored to the earlobes.

"You don't have to tell me or anyone about it. But you were under stress, right? And VIP took your *antipodes* as *antipathies* and gave Marketing a psychiatric lecture instead of a trade report."

"And the other time, the abscissas. That was when he threatened me that if I didn't—"

"Shh," he interrupted. "I don't have to know as long as you do." He waved a hand. "Type."

Office efficiency dictates that an office chair be designed to avoid low back pains. The comfort and well-being of the employee is important, of course, but the truly basic thrust is the accomodation of the whole human being to the office environment. VIP is so sophisticated that such a simple basic can be overlooked. Unless and until VIP can be programed to respond unfailingly to its operator in any mood—laughing, furious, frightened, weary—it should be used only in periods of complete calm. Unless VIP can accomodate all the facets of a human being—the irrational child, the bigot, the day-dreamer, the wishful thinker, the spring-feverish, as well as it does the carefully schooled office presence, I recommend that it go back to the drawing boards until it can.

You'll get my bill in the morning. Right now I'm taking Miss Kuhli to lunch.

MERRIHEW ★

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In celebration of the 221st anniversary of Benjamin Franklin's first announcement—in the October 19th, 1752 issue of his Gazette—of his lightning-taming electric kite experiment that reordered his world and ours.

ODE TO ELECTRIC BEN

RAY BRADBURY

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Ben Franklin was that rarity:
A man whose jolly-grim polarities did tempt our God
To hurl his bolts which, fastened to Ben's ears,
Lit up his cerebrum for years
And thus illuminated reams of history.
His dreams, electric dreams,
Were knocked together out of Boy Mechanic schemes;
He whet his finger, held it to God's Mystery and Storm.
God, in turnabout, gesticulated, touched
To know Ben's warm or cooling weather.
So somehow these unconvivial two
Fell in together and were friends.
Their means quite different
But most similar-same their ends:
To Light the Universe,
Or light a world,
Large thing or small.
God blinked and Lo! the Nebulae!
Ben blinked; electric founts poured from his hands;
Within a century his sparks had lit the lands
And filled the towns with noon at night.
Such was God's vision.
Such was Ben's sight.
And after long years, some eighty-odd or more
Of intemperate days, good afternoons, storms, calms,
Bad fights, then making peace,
Vast multiples of weather,
God yawned, Ben gummed his eyes,
But still arguing . . . went off to bed together.

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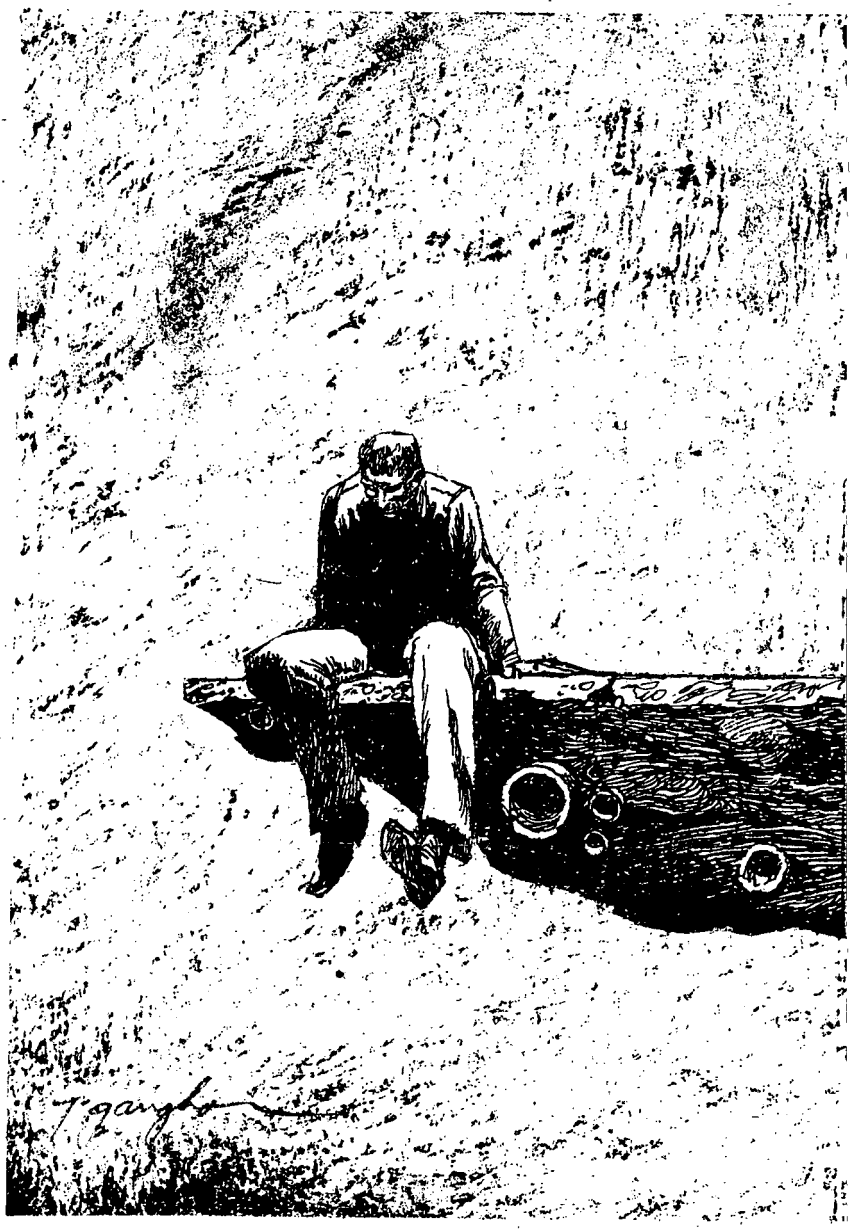

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HARLAN ELLISON

COLD FRIEND

Know your local mailman, whom nothing can stop . . .

BECAUSE I had died of cancer of the lymph glands, I was the only one saved when the world disappeared. The name for it was "spontaneous remission," and as I understand it, it is not uncommon in the world of medicine. There is no explanation for it that any two physicians will agree upon, but it happens every so often. Your first question will be: why are you writing this if everyone else in the world is gone? And my answer is: should I disappear, and should things ever change, there should be some small record available to whomever or whatever comes along.

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That is hypocrisy. I write this because I am a thinking creature with an enormous ego and I cannot bear to consider having been here, being gone and leaving nothing behind. Since I will never have children to carry on my line, to preserve some tiny bit of my existence . . . since I will never make a mark in the world, because there is no world left . . . since I will never write a novel, or paste up a billboard, or have my face carved on Mt. Rushmore . . . . I am writing this. Additionally, it keeps me busy. I have explored all three square blocks of what's left of the world and, quite frankly, there isn't much else to do to amuse myself. So I write this.

I have always had the detestable habit of having to justify myself.

Let me hear some vague rumor or snippet of gossip about myself and I spend *weeks* tracking it down, refuting it, bringing to justice the one who passed the remark. Now that's just ridiculous. And here I am justifying myself again. This record is here, read it if you please, or don't. That's that.

I was in the hospital. I was terminal. Oxygen tent, tubes plugged into me everywhere, constantly sedated, the pain was the worst thing I've ever known—it never stopped. Then—I just started to get well. First I died. I know I died. Don't ask me how I can say such a thing with complete assurance that I'm telling the truth, because if you've ever died, you'll know. Even under the knockout stuff they'd pumped into me, I still had some awareness. But when I died it was as if I was strapped flat to the front of a subway car, spreadeagled to the wall, facing down the tunnel, into the blackness, and the subway car was hurtling along at a million miles an hour. I was utterly helpless. The air was being sucked out of my lungs and the train just slammed down that tunnel toward a little point of light. And in receding waves of sound I heard a whispering voice calling my name, over and over and over: *Eugene, Eu-gene, Eu-gene, Eu-gene . . .*

I went screaming down at that tiny square of light at the end of the tunnel and I closed my eyes and could see it even with them closed. And then I crashed forward even faster and went into the spot of light and everything was blinding and I knew I was dead.

A long time later—I think it was two hundred years; on the other hand it may only have been a day or two—I opened my eyes and there I was in the hospital bed with a sheet up over my face.

I lay like that for almost a day. I could see the light of the ceiling fixture through the sheet. No one came to help me and I felt weak and hungry.

Finally I got angry and I was so hungry I couldn't stand it any longer, so I whipped the sheet down off my face and pulled the remaining tube out of my arm—I presumed it to be an intravenous feeding tube and

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whatever had been left in the bottle was what had sustained me—and got out of bed. I slid my feet into my slippers—the heels of my feet were red and dry like the heels of old women in nursing homes—and in that ridiculous hospital gown I went looking for something to eat. I couldn't find the kitchen of the hospital at first, but I found a candy machine. I didn't have any dimes for it, but there was a nurse's station right there. And I was so angry at being ignored I rummaged through some drawers and a purse under the counter till I found a handful of change.

I ate four Power House bars, two almond Hersheys and a box of those pink Canada mints.

Then, sucking on tropical fruit Lifesavers, I went looking for the hospital staff.

Did I mention the hospital was empty?

The hospital was empty.

EVERYONE was gone, of course. I told you that at the outset. But it took me a few hours to establish the fact. So I got dressed and went outside. Everything looked the same. The name of this town is Hanover, New Hampshire, if you need to know. I won't bother with what the names of streets and things were when it was in the world, because I've given them all new names. It's my town now, all mine, so I decided I'd call it what I felt like calling it. But when this town was in the world, Dartmouth College was here and there was good skiing and it was desperately cold in the winter. Now the mountains are gone and it hasn't been winter in a year or so. Dartmouth is also gone. It lay outside the three block area of what was saved when the world vanished. There's a pizza place here, though. I don't know how to make pizza, though I've tried. I think I miss that most of all. Isn't that mundane! My God.

The world is gone and all I seem to be able to dwell on is pizza. What hapless little creatures we humans were. Are. Am. I am.

So. I was alive again and I suppose the only reason I didn't poof away with all the rest of them was that everyone thought I was dead. I *suppose* that's the reason. I don't really know. I'm guessing, of course; but since none of this made any sense at the time, that was my only conclusion.

If you think I'm terribly calm and rational about something as berserk as this, you can believe that I was frantic when I wandered out into the street in front of the hospital and saw the street was empty. I started walking, sticking my head into one store after another, looking for *any*body. And every once in a while I'd stop and cup my hands around my mouth and yell, "Hey! Anybody! Eugene Harrison! Hey! Anybody there?" But there wasn't a soul.

When the world was here I was a postal clerk. I'm not from Hanover, I lived in White Sulphur Springs. I was

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brought to Hanover, to the hospital, to die.

When I got to the end of the world—at the foot of the street where the hospital stood—I just stared. I sat down and dangled my feet over and just stared.

Then I scrunched around and lay on my stomach and looked over the edge. The ground sloped back, under there, and beneath the sidewalk there was dirt—I could see roots hanging out—and it gave a wedge-shape to the chunk of world floating with me on it. And underneath the chunk there wasn't anything. I guess it's not anything. I tried lowering myself on a mountain-climber's rope once about a month later, but even when I threw the rope over the edge it just lay there in the emptiness and wouldn't fall straight down.

I think perhaps gravity is gone out there, too.

SO. I GOT UP and decided to circumnavigate the chunk. It was three blocks square, just the buildings and the bit of park and the hospital and some small houses. The U. S. Post Office was also there. I spent one day, a while later, a whole day, sorting the mail that had been left behind when the world vanished, stocking one of the clerks' windows, oiling the wheels of the carts, sewing up the storage bags with the heavy thread and monster needle every substation keeps in its larder. It was one of the dullest days of my life.

I don't want to say too much about myself—hypocrisy again—just enough to pass me on down to you so I won't be forgotten or faceless. I've already said my name is Eugene Harrison, from White Sulphur Springs, and I was a postal clerk. I was never married, but I've had relationships with at least four women. None of them lasted very long—I think they got tired of me, but I don't know for sure. I'm moderately educated: I went two years to Dartmouth before I dropped out and went to work in the Post Office. I was majoring in arts and letters, which means I thought perhaps I would go into advertising or television or journalism or something. That was certainly a waste of time. I can write things down in order and even with a little grace, but I'm no writer, that's for certain. I can't keep myself at the writing for very long—I get very antsy. And I think I use the word "very" too much.

I wish I could tell you there was something particularly heroic or remarkable about me—besides the dying, that is—but I am just like all other people I've ever known. Or, like they were. They aren't any more. That's the truth. And I think it takes a big person to admit that he's very ordinary. My socks always matched. I forgot to fill the gas tank sometimes and ran out and had to carry a can up the road to the station. I shirked some of my responsibilities. I made gallant gestures occasionally. I hate vegetables.

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My interests were in travel and history. I never did much about either. I went to Yucatan one summer and I read a lot of history books. Neither of those is very interesting.

It would be great to be able to say I was special, but I wasn't. I'm thirty-one years old and I'm just plain damned *average*, damn it, I'm *average,* so stop it, stop your damned badgering! I'm a nothing, a nobody, you never even saw my face through the wicket when I gave you your stamps, you arrogant swine! You never paid me the least attention and you never asked me if I'd had a good day and you never noticed that I trimmed the borders of the stamps I sold you—if they weren't full sheets, because many people collect full sheets—but you *never even noticed that little service!*

That's how I was special. I cared about the little things. And you never paid any attention.

I don't care to tell you any more about myself. Listen, this is about what happened, not about me, and you don't care about me anyhow, so there's no need to carry on like that about myself.

PLEASE excuse what I wrote just now. It was an outburst. I'm sorry. And I'm sorry I cursed. I didn't mean to do that. I am a Lutheran. I attended Our Redeemer Lutheran Church in White Sulphur Springs. I was raised not to curse.

I'm going on now to what happened.

I walked all around the edge of the chunk of the world. It wasn't chopped off neatly. Whatever had done it, made the world vanish, had done it sloppily. The streets came to ragged ends, telephone lines trailed off where they'd dropped and some of them hung off into the emptiness, just floating like fishlines in water.

I should tell you what it looked like out there beyond the edge. It looked like a winter snowfall, murky and with falling motes of light like snowflakes, but it was dark, too. I could see through the dark. That was what made it frightening: one shouldn't be able to see through the darkness. There was a wind out there, but it didn't blow. I can't describe that any better. You'll have to imagine it. And it wasn't cold or hot. It was just pleasant.

So I spent my days in what had been Hanover; I spent them all alone. And there was nothing heroic about me. Except that during the first week I saved my town from invasion about fifty times.

That will sound remarkable, but I assure you it wasn't. The first time it happened I was coming out of the Dartmouth Bookstore on Main Street, carrying several paperbacks I had taken to read, when this Viking came screaming down the street. He was enormous, well over six feet tall, with a double-bitted axe in his hand and a helmet with two horns and a fierce orange beard. He was wearing

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furs and thongs and a bearskin cape and he came right at me, shrieking in some barbarian language, with blood in his eyes and certain as God determined to hack me to bits.

I was terrified. I threw the paperbacks at him and would have run if I had been able to run, but I knew he'd catch me.

Except, what he did was: he threw up his free hand to ward off the paperbacks and swerved around me and started running away from me down a side street. I couldn't understand what was happening, but I picked up the paperbacks and took off after him. I ran as fast as I could, which was pretty fast, and I started to catch up to him. When he looked over his shoulder and saw me coming, he screamed and ran like a madman.

I chased him right off the edge of the world.

He kept on running, right out into that darkness with the snowstorm in it and he disappeared after a while, but I saw him still running at top speed till he shrank out of sight. I was afraid to go after him.

Later that day I turned back an attack by a German Stuka that strafed the main street, an attack by a Samurai warrior, an attack by a Moro with a huge batangas knife, an attack by a knight on a black horse—he carried a couched lance—and attacks by a Hun, a Visigoth, a Vandal, a Vietcong with a machine gun, an Amazon with a mace, a Puerto Rican street mugger, a Teddy Boy with a cosh, a deranged and drugged disciple of Kali with a knotted silk rope, a Venetian swordsman with a left-hand dagger, and I forget which all that first day.

It went on that way all that week. It was all I could do to get any reading done.

Then they stopped and I went about my business. But none of that was heroic. It was just part of the new order of things. At first I thought I was being tested—then I decided that was wrong. Actually it got annoying and I stood on the steps of the hospital and yelled at whoever it was responsible, "Look, I don't want to know about any more of this. It's just nonsense, so knock it off!"

And it stopped just like that. I was relieved.

I HAD no television or movies (the movie house was gone) or radio, but the electricity worked fine and I had music and some talking records. I listened to Dylan Thomas reading *Under Milk Wood* and Erroll Flynn telling the story of *Robin Hood* and Basil Rathbone telling the story of *The Three Musketeers.* That was very interesting.

The water worked, and the gas, and the telephones didn't work. I was comfortable. There was no sun in the sky or moon at night, but I could always see as if it were daylight in the daytime and clear enough to get around by night.

I saw her sitting on the front steps

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of the Post Office—I guess it was about a year after I'd died; I know that doesn't sound right, but time is different now—and I hadn't seen anyone else after the invaders stopped doing their crazy screaming thing in the streets. She was just sitting there with her elbow propped on her knee and her chin resting in her palm.

I walked down the street to her and stopped right in front of the Post Office. I was waiting for her to leap up and scream, "Amok! Amok!" or something, but she didn't. She just stared at me for a while.

She was awfully pretty. I'm not good at describing what people look like, but you can take it from me, she was very pretty. She was wearing a thin white gown that I could see through and she was pretty all over. Her hair was long and gray, but not old gray—it was gray as if she liked it that way, the fashionable young person kind of gray. If you know what I'm getting at.

"How do you feel?" she asked finally.

"I'm all right, thank you."

"Have you healed up nicely?"

"I knitted real well. Who are you? Where did you come from?"

She waved toward the end of the world and around the street and shrugged. "I don't know. I just sort of woke up here. Everybody else is gone, is that right?"

"That's right. They've been gone for about a year. Well, uh, where did you wake up?"

"Right here. I've been sitting here for about an hour. I was just starting to get my bearings. I thought I might be all alone here."

"Do you remember your name?"

She seemed annoyed at that. "Yes, of course, I remember my name. It's Opal Sellers. I'm from Boston."

"This was Hanover, New Hampshire."

"Who are you?"

"Eugene Harrison. From White Sulphur Springs."

She looked very pale. I didn't say it, but that was the first thing about her I noticed. It wasn't the dress I could see through, really—it was the paleness. Just very white, as if she had been left out too long in the snow. I thought I could see the blood rushing along under the skin, but that was probably my imagination.

Now I know someone is going to think she was a ghost or a vampire or some alien creature dressed up to look like a human being, but as Nero Wolfe says in the mysteries, that is just flummery. She was a person, nothing more than that, and you can forget that sort of stuff, even with what comes next. She was as real as I was.

"How did you know I'd been sick?" I asked.

She shrugged again. "I don't know—I suppose I just knew, that's all. But I saw you coming out of the hospital up the street."

"I live there. But how could you know I was sick? Actually, I almost died. Well, that's not accurate. I *did*

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die, but I'm all right now."

"What do we do here?"

"Nothing much, just take it easy. The rest of the world is gone and I don't know where, so we just sort of take it easy, I guess. There used to be a lot of crazy invasions about eight months ago, but they stopped pretty suddenly."

"I'll need a place to live," she said. "How about the hospital?"

"Well, that's fine with me," I said, "but actually, I was going to take over one of those little houses over there. If you like, you can move into the one next door."

SO SHE did and I did and it was nice for a few weeks. I always went very slowly with women. Or maybe it's that they went slow with me. I'm a big believer that women give off radiation or something that keeps a man from moving in on them if they don't want him to. I don't know much about it, if you want the truth.

We had a cordial relationship, Opal and I. She kept up her yard and I kept up mine. We ate dinner together a lot and we saw each other frequently through the day. Once—when she realized I was spending time at the Post Office—she came in with a letter and came up to my window and asked me for an air mail stamp. She had money. I sold it to her. She took it and said, "Thank you for removing those little white borders. I always have trouble with them and usually rip the stamp or leave some on the edge. That was very nice of you, sir." And she left.

I was too stunned and pleased to even consider where she was mailing the letter to.

Or to whom she was writing.

One night we had dinner together and she made fried chicken. The grocery store had a large supply of food, more than enough for us for a long time. It did bother me, of course, that the milk was always fresh and the meat was always freshly cut, but I assumed it was part of the scheme of things that kept the lights and water working, that took away the garbage and kept the streets clean. I never saw anyone who did it, but it got done, so I didn't worry about it.

Look: before I died, when the world was here, I drove a mail truck and I rode a Honda. I didn't know how either of those things worked, I mean aside from cleaning the spark plugs once in a while or filling the gas tanks, or superficial repairs like that. I never worried about it, because it got done, and that was the long and short of it. No one was any different. It was the same after everything vanished. As long as it worked I didn't have to think about the logic of it. If it had started going sour I *would* have; but it didn't, and that's all I want to say about that. You'd have done the same.

Anyhow. We had this fried chicken dinner, which I liked a lot because she made it just the way I

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like it, dark and golden and crunchy on the surface and dry underneath, without that thin oily film that makes your teeth feel greasy. And we had some wine.

Now I don't drink much. I won't apologize. I can't hold it. But we had wine.

And I got, well, a little drunk, just a little. And I tried to touch her. And she was cold. Very cold. Very very cold. And she yelled at me, "Don't *ever* touch me!"

Now that was just two weeks before she told me she loved me and wanted to be mine. I asked her what she meant by that, "be mine." I never wanted to own anybody. And I certainly had the idea *she* didn't want to be anybody's possession, but there it was.

"I love you and I want to stay with you."

"There's no place to go."

"That isn't what I meant. We could live here together and not see each other. I mean, I love you and want to share the world with you."

"I don't know if that's a good idea," I said. I really wanted what she wanted, but I was afraid she'd get tired of me, and then what? Our situation wasn't too normal, at least by the usual standards I'd grown up with, if you catch my meaning.

So. She got angry and went stalking out the door. I waited a few minutes to let her cool off and then I went looking for her.

She had walked straight out to the edge of the world, and kept right on going. I don't think she knew I was following her.

I went back to my house and laid down.

When she came back, about two hours later I guess, I sat up and said, "Just who the dickens *are* you?"

She was furious—still furious. "Who the dickens are *you*?"

"I know who I am," I said, getting angry too, "and I want to know who you are. I saw you walking out there off the edge. *I* can't do that!"

"Some of us are talented, some aren't. Learn to live with it." Really a snotty answer, boy!

"I was here first!"

"That's what the Indians said and look what happened to *them*!"

"Dammit, are you responsible for all of this, for every crazy thing that happened?"

THEN SHE really blew her stack and shouted at me, "Yes, you silly, irresponsible clown, I'm responsible. I did it all. I destroyed the world. Now what the hell are you going to do about it?"

I was too stunned to do anything. I hadn't really thought she was responsible, but when she admitted it I didn't know what to say. I went over and tried to grab her by the shoulders and I could feel that cold coming right off her. "You're not human," I said.

"Oh, go to hell, you idiot. I'm as human as you are. Humaner."

"You'd better tell me," I said in a threatening tone, "or else—"

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"Or else what, you nerd? Or else I'll wipe out this last little chunk and you and everything else and I'll be all alone the way I was before I did it!"

"Did it?"

"Yes, *did it.* Blew it all away. Just sat back and put my thumb in my mouth and said, 'Vanish everything but Eugene Harrison, wherever he is, and me, and a little town where I can be with him.' And when I took my thumb out of my mouth, everything was gone. Boston was gone and the sky and the Earth and every other thing, and I had to go walking through that glop out there till I found you."

"Why?"

"You don't even recognize me, do you, you idiot? You don't even remember Opal Sellers, do you?"

I stared at her.

"Dope!"

I continued staring.

"I was in your graduating class in high school. You were right behind me when we went up for our diplomas. I was wearing a white gown and you were standing behind me during the invocation. And I was having my period and I was spotting and it had gone through the white gown. And you leaned over and told me and I was embarrassed to death, but you gave me your mortarboard and I held it across my backside and I thought it was the kindest, nicest thing anyone had ever done. *And I loved you, you simple stupid insensitive sonofabitch!"*

And she let down the screen or the image or the mask or whatever it was that she'd put up over herself, which was why she was cold to the touch, and inside there was Opal Sellers, who was one of the ugliest girls I'd ever seen, and she knew that was what I thought, and she didn't wait a minute but put her thumb in her mouth like I remember she used to and started mumbling around it—but nothing happened.

Then she went completely out of her head and started screaming that she'd passed on the power to me, and she couldn't do a thing about me and she ran out the door.

I took off after her, and she went off the edge and kept going straight away like the Viking and the Stuka and the Hun and all the rest of them, which I guess she'd sent to liven things up for me so I would feel heroic.

And that's it.

Gone. Just went. Where, I have no idea. I'm not leaving here, that's for sure, but I don't know what to do about it. *Some*body ought to say I'm sorry to her, I mean—she's a nice girl and all.

It's just I'm here and I'm comfortable and who can ask for more than that? She was always talking about love. Well, damn, that wasn't love.

I don't think.

But what do I know? Girls always got tired of me very quickly.

I'm going to teach myself how to make pizza.

★

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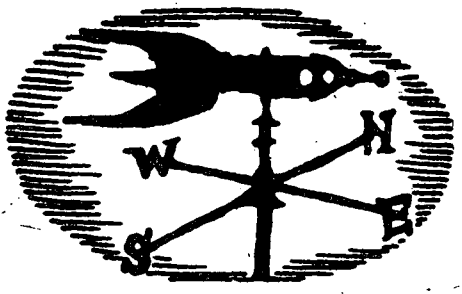

DIRECTIONS

This—the October '73—issue of *Galaxy* set out to be special in that it makes our return to monthly publication a concrete reality. By happenstance it also marks an anniversary—the very first issue of *Galaxy* bore the October 1950 cover date.

Partly to celebrate and partly out of curiosity we invited authors to submit representative works to show us—and the world—the state of the art right now. The result is a glittering array of contents, ranging from deepest traditionalism to the latest speculative approach to squeeze under our copy deadline: Harlan Ellison's probe of the U.S. Mail at the irreducible (atomic?) level of a mailman who has mislaid Earth itself—but not his human integrity and never (functionally) a piece of mail.

This one alone should fuel debate in *Directions* for months to come. But read it carefully and think of brief human lightnings—or lives—blinking across horizonless skies.

Science fiction has many faces—some real, others masked—and you and I will not meet all of them in our lifetimes. The response of the field to *Galaxy's* October '73 probe has been a flood of manuscripts and much has spilled over into November, including Michael Kurland's excellent *Think Only This of Me,* originally announced for October. Also in November: definitive works by Frederik Pohl, Robert Sheckley, R. A. Lafferty, Ernest Taves, Joe Haldeman and others.

Pertinent reader comment follows.

—JAKOBSSON

Directions:

The announcement of the Nebula Awards for '72 has caused a tired topic once again to raise its head—the so-called controversy between the Old and New Waves in science fiction. The event is noteworthy only because this time the issue is raised in an article in Publisher's Weekly, *where it will be noted by influential people.*

The piece describes current events on the science fiction scene as consisting of a continuous battle between these Waves—or, as PW *calls them, the Trads and the Mods, even going so far as to hail the announcement of the winners as a victory for Trads. What is implied is a conflict between two enemy camps—antipathy, perhaps even hatred. Who knows how many readers now try to classify an sf writer as either a Trad or a Mod and attempt to pigeonhole his style and meaning as one or the other? And how many editors and publishers will fall into the same trap and plan their programs and schedules accordingly? And—probably most important—how many sf writers are now nagged and haunted by this specter until they unconsciously gear their work along these narrow, arbitrary and heavily drawn lines? I can easily visualize a writer finally spending more time in*

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explaining what he writes than in the actual writing.

The important point the rabble-rousers and the author of the PW *article miss is that science fiction is a literature engrossed in change. As such, its very nature must accept change. As a formal literary form sf is hardly a half-century old, yet in that short time it has undergone a few upheavals. We moved from Gernsbackian scientifiction to Heinlein and Asimov* et al; *from there we went to* F&SF *and* Galaxy. *Now, or at least in the past five years or so, we're in the middle of another transition. The growth and development of sf has been remarkable, considering its short lifespan. How many centuries-long phases did other literary forms go through? How many thousands of years of tradition lay behind poetry before Pound and Imagists broke it wide open?*

Mine may be a simplistic analysis–I never claimed to be an Alexei Panshin. Yet those who really know the field would agree with me, I think. Writers and their work undergo changes as environmental conditions change. The past is not rejected or newness heralded for its own sake. A new writer may build on fresh foundations simply because suddenly they are there, and there are guidelines and a sense that run through all sf that make it sf. These are sf's paradigms–and even they may change. Even to consider separate Old and New Waves–or warring Trads and Mods–is laughable. All are manifestations of the same phenomenon and we have to consider all and arbitrarily reject nothing to get the complete picture.

As for the Nebula Awards themselves–well, I have thoughts about them as does everyone else.

Novel: The Gods Themselves, *Isaac Asimov. No argument. By far the best novel of the year. The only one that came close, I think, was Silverberg's* Dying Inside.

Novella: A Meeting With Medusa, *Arthur C. Clarke. Here it was very tight, I thought. Just as good were Ursula Le Guin's* The Word for World Is Forest *and Frederick Pohl's* The Merchants of Venus *and* The Gold at Starbow's End.

Novelette: Goat Song, *Poul Anderson. Here I would disagree. Good as* Goat Song *was, I thought Greg Benford's* In The Ocean of Night *had award-winner written all over it.*

Short Story: When It Changed, *Joanna Russ. A good choice. I can't really think of any other memorable shorts.*

A victory for the Trads? I don't think the question applies. The winners' works are as different from their long-ago efforts as those of the Mods are from old-line sf. Asimov's novel is much tighter, more in step with current times, than his earlier writings and his aliens are now truly alien. The same criteria apply to the Clarke, the Anderson and the Russ.

Perhaps I've gone on at too much length. But although I've seldom been vocal about it, I've long felt a commitment to science fiction in all its shapes and forms. I think I know the field as well as anyone and better than many. People who rely on spotting new trends and instantly labeling them separatist movements simply don't strike me as qualified to make judgments and analyses.

Glenn Chang
Evanston, Ill.

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FIELD OF VISION

Three star-men asked the ultimate question, and each got a different answer!

URSULA LeGUIN

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I saw Eternity the other night
Like a great Ring of pure and endless light . . .
—Henry Vaughan, 1621-1695

I

REPORTS from Psyche XIV came in regularly, all routine, until just before their return window opened. Then all at once Commander Rogers radioed that they had left surface, had rejoined the ship, and were commencing departure procedures—82 hours 18 minutes early. Houston, of course, demanded explanations, but Psyche's answers were erratic. The 220-second answer lag didn't help. Psyche kept breaking contact. Once Rogers said, "We have got to bring her home now if we're going to do it at all—" apparently in answer to Houston's questions, but the next thing was Hughes asking for a reading, and then something about a dosage. The sun was noisy and reception was very bad. The voice transmission ceased without sign-off.

The automatic information feed from the ship continued. Departure was normal. Normal reports came in during the 26 days of flight, which the astronauts spent in drugged sleep on HKL and IV hookups. There was no medical monitor on Psyche missions. The only link with the crew was voice contact. When they did not call in on Day 27, the long tension at Houston tightened to despair.

The onboard automatics, directed by the ground crew, had just about established Psyche's reentry course when the dead speakers suddenly said in Hughes' voice, "Houston, can you give me readings. Optical interference here." They tried to direct him, but the one attempt he made at a manual correction was disastrous and took ground control five hours to compensate for. They said hands off, they'd bring in the ship. Almost immediately after that they lost voice contact again.

The great pale parachutes opened above the gray Pacific—roses slowly falling out of heaven. The speed-burned ship screamed steam, plunging; popped back up and rocked, quiet, on the long deep swells. Ground control had done a beautiful job. She was down within a half-kilometer of the *California.* Helicopters hovered, rafts assembled, the ship was stabilized, the hatch opened. Nobody scrambled out.

They went in and brought them out.

Commander Rogers was in his flight seat, still strapped down and plugged into the HKL and IVs. He had been dead about ten days and it was clear why the others had not opened his suit.

Captain Temski seemed physically unhurt, but dazed and bewildered. He did not speak, or respond to instructions. They had to manhandle him to haul him out of the ship, though he put up no active resistance.

Dr. Hughes was in a state of

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collapse, but fully conscious—he appeared to be blind.

"Please . . ."

"Can you see anything?"

"Yes! Please let me have the blindfold."

"Do you see this light I'm showing? What color is it, Dr. Hughes?"

"All colors—white—ah, it's too bright."

"Please point toward it."

"It's everywhere. It's too—too bright."

"The room's quite dark, Dr. Hughes. Now, will you open your eyes again, please."

"It isn't dark."

"Mmmh. Possible supersensitivity here. All right now, how about that? Dark enough for you?"

"Make it dark!"

"No, keep your hands down, please. Take it easy. All right, we'll put back the compresses."

The struggling man relaxed as soon as his eyes were covered. He lay still, breathing hard. His narrow face, framed in a month's growth of dark beard, was oiled with sweat. "I'm sorry," he said.

"Will you open your eyes, please. The room's quite dark."

"Why do you tell me that when it's *not* dark?"

"Dr. Hughes, I can hardly make out your face. I've got the faintest red illumination on my scope—nothing else. Can you see me?"

"No! I can't see for the light!"

The doctor increased the illumination until he could see Hughes' face, the clenched jaw, the open, dazzled, frightened eyes.

"There, does that make it any darker?" he asked with the sarcasm of helplessness.

"No!" Hughes shut his eyes—he had gone dead white. "Get dizzy," he muttered, "the whirling—" Then he gasped for breath and began to vomit.

HUGHES was unmarried and had no immediate kin. His closest friend was known to be Bernard Decelis. They had trained together. Decelis had been specialist on Psyche XII—the mission that had discovered the "City" on Mars—as Hughes was on XIV. Decelis was flown to the debriefing station in Pasadena and instructed to go in and talk with his friend. The conversation was, of course, recorded.

D. Hullo, Gerry. Decelis.
H. Barney?
D. How you doing?
H. Fine. You been okay?
D. Sure. No picnic, was it?
H. How's Gloria?
D. Fine, just fine.
H. She got past Aunt Rhody yet?
D. (laughs) Oh, Christ, yeah. She can play Greensleeves now. At least she calls it Greensleeves.
H. What have they got you in this dump for?
D. See you.

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H. Wish I could return the compliment.

D. You will. Listen. I've been assured by three different oculists—or whatever the hell they are, opthamollywhoggers, eye doctors—here that there is absolutely nothing wrong with your eyes. Three opthamacadamizers and a neurologist, in fact. It's a sort of chorus they have.

H. So what's wrong is my brain, evidently.

D. In the sense of a crossed connection, maybe.

H. What about Joe Temski?

D. I don't know. Haven't seen him.

H. What did they tell you about him?

D. They didn't have a chorus line worked out for him. Just said he's inclined to be withdrawn.

H. Withdrawn! Jesus, I'll say so. Like a rock is withdrawn.

D. Temski? That joker?

H. It started with him.

D. What did?

H. At the site. He stopped answering.

D. What happened?

H. Just that. He stopped answering. Stopped talking. Stopped noticing. Dwight thought it was cafard. Is that what they're still calling it?

D. It's mentioned as one possibility. Was there anything special that happened—there at the site?

H. We found the room.

D. The room, yeah. That all came back in your reports. I've seen them, and some of the holos you brought back with you. Fantastic. What the hell is it, Gerry?

H. I don't know.

D. Is it a construct?

H. I don't know. What's the whole City?

D. It was built, made—it must have been.

H. How do you know? How can you tell when you don't know what made it? Is a seashell "made"? If you didn't know—if you didn't have any background and couldn't assume any likeness and you looked at a seashell and a ceramic ashtray—could you tell, could you say which was "made"? And what for? What does it mean? Or what about a ceramic seashell? Or a paper wasp nest? Or a geode?

D. Yeah, okay. But what about those things, that—arrangement that you call "pigeonholes" in the reports. I saw the holos. Tell me, what did you make of them?

H. What did you make of them?

D. I don't know. They're weird. I thought of running the spatial arrangements through a computer, looking for meaningful pattern . . . You don't think much of that.

H. No. Fine. Only what are you

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to program for "meaning"?

D. Mathematical relationships. Any kind of geometrical pattern—regularity—code. I don't know. What was the place like, Gerry?

H. I don't know.

D. You were in there a lot?

H. All the time—after we found it.

D. That's where you noticed this kind of eye trouble you've got? How did it start?

H. Things going out of focus. Like eyestrain. It was worse outside the room. Came on over several days. I could still make things out all right when we were taking the ML up to the ship. But getting worse. There'd be these flashes of light, left my depth perception all screwed up—I'd get dizzy. Dwight and I set up the course—one or the other of us was functioning most of the time. But he was getting kind of wild. Didn't want to use the radio, wouldn't touch the onboard computer.

D. What was . . . wrong with him?

H. I don't know. When I told him about my eyes he said he'd been having something like shaking fits. I said we'd better get the hell up to the ship while we could. He said okay, because Joe was really beginning to not function. Before we even launched he started having some kind of seizures, like epilepsy—Dwight, I mean. When he came out of one he was shaky, but he seemed rational. He took us up okay, but as soon as we docked in he went into another fit. The fits kept getting longer. He started hallucinating in between them. I gave him some tranquilizers and strapped him in—it was wearing him out. When I took the sleep—I don't know, he could already have been dead then.

D. No, he died in the sleep. About ten days out from Earth.

H. They didn't tell me that.

D. There wasn't anything you could have done, Gerry.

H. I don't know. Those attacks he had—they were like overloads. Like all his fuses blew. Burned him out. He talked while he was in them. Sort of in bursts, like barking—as if he was trying to say a whole sentence at once. Epileptics don't talk, do they, when they're having a seizure?

D. I don't know. Epilepsy's so well controlled now you don't hear much about it. They catch the tendency and cure it first. If Rogers had had the tendency . . .

H. Yeah. He never would have been in the program. Christ, he'd had six months in space.

D. What had you had—six days?

H. Like you. One moon hop.

D. It isn't that, then. Do you think . . .

H. What?

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D. Some kind of virus?

H. Space plague? Martian fever? Mysterious ancient spores that madden astronauts?

D. All right, it sounds dumb. But look, the room had been sealed. And it does sound like all of you—

H. Dwight gets a cortical overcharge. Joe goes catatonic. I start seeing things. What's the connection?

D. Nervous system.

H. Why different symptoms in each of us?

D. Well, drugs affect people differently—

H. Do you think we found some kind of goddamned Martian psychogenic mushrooms in there? There isn't anything there—it's dead, like all the rest of Mars. You know, you've been there! There aren't any goddamned germs or viruses—there's no life there, no life.

D. But there may have been—

H. What makes you think so?

D. The room you found. The City we found.

H. City! For Christ's sake, Barney, you talk like some damned pop journalist. You know damned well the whole thing is a set of mud concretions for all we can tell. There's no way to tell. It's too old—conditions are too different. We have no context. We don't understand—we can't understand—it's something the human mind is outside of. Cities, room, all that—we're just analogizing, trying to make sense in our terms. But it's not in our terms. There is no sense. I can see that now. That's the only thing I can see!

D. See what, Gerry?

H. What I see when I open my eyes!

D. What?

H. Everything that isn't there and doesn't make sense. Oh—I—

D. Here, come on. Take it easy. Look, it'll be okay. It's going to be all right, Gerry. You'll be fine.

H. (unclear) light, and the (unclear) try to see what I touch and I can't, I don't understand and I can't (unclear) . . .

D. Hang on. I'm right here. Take it easy, old man.

II

HUGHES, who had entered the space program from astrophysics, came with a very good record—in fact, a brilliant one. This troubled many of his military superiors, to whom high intelligence was a code word for instability and insubordination. His performance had been solid and his behavior irreproachable, but now it was frequently recalled that he was, after all, an intellectual.

Temski was harder to explain. He was a crack test pilot, an air force captain and a baseball fan, but now his behavior was even more aberrant

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than Hughes'.

All Temski did was sit. He was capable of looking after himself and did so. That is, when he was hungry and food was present he ate some with his fingers. When he had to relieve himself he went to a corner and did so. When he was sleepy he lay down on the floor and slept. The rest of the time he sat. He was in good physical condition and quite calm. Nothing said to him produced the slightest reaction, nor did he take any interest in anything that went on. His wife was brought in to see him in hopes of producing a response. She was taken away weeping after five minutes.

Since Temski wouldn't respond and Rogers, being dead, couldn't respond, it was quite natural to look upon Hughes as being, somehow, responsible.

There was nothing wrong with him except a case of something like hysterical blindness, so it was to be expected that he should answer questions rationally and explain precisely what had happened. This, however, he could not—or would not—do.

A psychiatric consultant was brought in, a distinguished man called Shapir. He was requested to work with both Temski and Hughes. It was, of course, unthinkable to admit that the mission had been a failure (the word "disaster" was not even mentioned), but a couple of rumors had leaked out to the press despite all security precautions. Irresponsible journalists demanded to know why the crew of Psyche XIV was being held incommunicado and claimed the "right" of the American people to "know," etc. It had been necessary to issue a statement concerning a new health test being run on astronauts who had spent over fifteen days in space—this because of Commander Rogers' unexpected and tragic death from heart failure—and to have a whole new series of articles written for the media concerning plans for a "Little America" dome city on Mars, in order for the authorities to maintain a positive attitude in public. The real people, of course, knew that the rest of the Psyche program was in jeopardy—they instructed Dr. Shapir to diagnose and cure the astronauts with all deliberate speed.

Shapir talked with Hughes for half an hour about the food in the hospital, Cal Tech, and the latest Chinese report on their Alpha Centauri probe, all very relaxed and trivial. Then he asked, "What is it you see when you open your eyes?"

Hughes, who was up and dressed now, sat silent for a while. Opaque goggles covered his eyes entirely, giving him the arrogant, staring look of people who affect dark glasses.

"Nobody's asked that," he said.

"Didn't the oculists?"

"Yes, I guess Kray did. Early on. Before they decided I was a mental case."

"What did you tell him?"

"It's hard to describe. The point is, it's indescribable. At first it was

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things going out of focus, going transparent, going away. Then the light. Too much light. Like overexposing a film, bleaching everything out. But with that, a kind of whirling. Changing positions and relationships, changing perspectives, constant transformation. It made me get dizzy. My eyes kept sending signals to my inner ears, I guess. Like that inner-ear disease, only in reverse; doesn't it foul up your spatial orientation?"

"Meuniere's syndrome, I think it's called, yes, it does. Especially on stairs and slopes."

"It's as if I were looking from a great height, or. . .up at a great height . . ."

"Heights ever worry you?"

"Hell, no. They don't even mean anything to me. What's up and down, in space? No, see, I'm not giving you the picture. There is no picture. I've been trying to look more, to learn to . . . how to see . . . It's not much good."

There was a pause. "That takes courage," said Shapir.

"What do you mean?" the astronaut asked sharply.

"Well, to have the sensory input most important to the conscious mind—sight—reporting nonexistent and incomprehensible things in flagrant contradiction with all other sensory input—your touch, your hearing, your sense of balance and so on—to have that going on every time you try to open your eyes, and not only to live with it but to attempt to investigate it . . . It doesn't sound easy."

"So mostly I keep my eyes shut," Hughes said dourly. "Like a damned see-no-evil monkey."

"When you do have your eyes open and you look toward some object you know is there—your own hand, for instance—what do you see?"

" 'A blooming, buzzing confusion.' "

"William James," Shapir said with satisfaction. "What was he talking about—how a baby perceives the world, eh?" He had a pleasant voice with a mild, glancing quality to it, non-percussive—one could not imagine him scolding or yelling. He nodded several times, thinking out the implications of what Hughes had said. "To learn how to see, you said. To learn. That's how you feel about it?"

Hughes hestitated, then said with a sudden, marked increase of trust, "I have to. What else can I do? Apparently I'm never going to be able to—to see the way I used to, the way other people do, again. But I still do *see*. Only I don't understand what I see—it doesn't make sense. There are no outlines, no distinctions, even between nearer and farther. There *is* something there—only I can't say that, because there aren't any *things*. No forms. Instead of forms I see transformations—transfigurations. Does that make any sense at all?"

"I think it does," Shapir said, "only it's enormously difficult to put

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a direct experience into words. And when the experience is new, unique, overwhelming . . ."

"And irrational. That's it." Hughes spoke now with real gratitude. "If only I could show it to you," he said wistfully.

THE two astronauts were being kept on the tenth floor of a big military hospital in Maryland now. They were not permitted to leave that floor, and anyone who visited it still spent ten days in quarantine before he rejoined the outer world: the Martian Plague theory was currently on top. At Shapir's insistence, Hughes was allowed to go up to the roof garden of the hospital (after which the elevator was elaborately sterilized and roped off for three days).

They demanded that Hughes wear a surgical mask—and Shapir had asked him not to wear his goggles. Docile, he went up the elevator with his mouth and nose covered, his eyes uncovered, but tightly shut.

The change from the dusk of the elevator to the hot smoggy sunlight of July on the open roof did not, as far as Shapir could see, affect those shut eyes. Hughes did not screw them tighter against the flooding light, though he raised his face to it as if he felt the heat pleasant on his skin. He took a deep breath through the binding gauze.

"I haven't been outside since March," he said.

It was true, of course. He had been in a spacesuit or in a hospital room, breathing canned or conditioned air.

"Have you got your compass bearings?" Shapir asked.

"Not the faintest. It makes me feel blinder, being outdoors. Afraid to walk off the edge." Hughes had refused assistance coming through the corridors and in the elevator, feeling his way adeptly with his hands, and now, despite his joke about falling off, he began to explore the roof garden. He was exhilarated, an active man released from long confinement. Shapir watched him, brooding. The low furniture was a hazard to him but he learned at once how to feel for it—he had tactile intelligence. There was grace in his movements even as he blundered in blindness.

"Will you open your eyes?" Shapir said in his glancing, reluctant voice.

Hughes stopped. "All right," he said, but he turned toward Shapir and his right hand came up gropingly. Shapir came forward and let that hand take his arm.

The grip of it tightened as Hughes opened his eyes. Then Hughes let go and took a step away, stretching out both his arms. A cry broke from him. He reached forward and upward, his head back, his eyes wide open, staring at the empty sky. "Oh, my God!" he whispered and dropped like a man hit by a sledgehammer.

Psychiatric counseling session, 18 July. S. Shapir, Geraint Hughes.

S. Hello. Sidney. I won't stay

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long. Listen, that wasn't such a bright idea of mine. The roof. I'm sorry. I had no idea. But no right, either. Would you rather I left?

H. No.

S. All right. I'm getting stir-crazy myself. Need a good walk. I walk a good deal, usually. About two miles to my office and the same back. Then I add detours. Whatever they say, New York is a beautiful town to walk in. If you know how to pick your route. Listen, I have a queer story about Joe Temski. Not a story, just a queer fact, actually. Did you know that they have written on his record that he is "functionally deaf?"

H. Deaf?

S. Yes, deaf. Well, you know—I began to wonder. I go in and talk to Joe, touch him, try to make eye contact, any kind of contact, to get through. No go. I've had patients tell me in so many words, "I can't hear you." A metaphor. But what if it isn't a metaphor? It happens sometimes with little kids—they're called retarded and it turns out they've got thirty, sixty, eighty per cent hearing dysfunction. Well, maybe Joe really can't hear me. Just like you can't see me.

H. (Pause of 40 seconds) Do you mean he's hearing things? Listening?

S. It's possible.

H. (Pause of 20 seconds) You can't shut your ears.

S. That's what I thought, too. It could be rough, couldn't it? Well, what I thought was—what about trying to shut them for him? Put earplugs in his ears?

H. He still wouldn't be able to hear you.

S. No, but he wouldn't be distracted. If you had to watch your light show all the time you wouldn't be able to pay much attention to me or anything else, right? Maybe it's like that with Joe. Maybe there's this noise drowning out everything else for him.

H. (Pause of 20 seconds) It would be more than noise.

S. I don't suppose you want to talk about . . . on the roof . . . No, all right.

H. You'd like to know what I saw, wouldn't you?

S. Sure I would. But in your own time.

H. Yeah, I've got so much else to do here besides talk to you. All the books I can read and the beautiful women I can look at. You know damned well I'll tell you eventually, because I haven't got anybody else to talk to.

S. Oh, hell, Geraint—(Pause of 10 seconds)

H. Shit. I'm sorry, Sidney. If I didn't have you to talk to, I'd have cracked completely. I

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know that. You're very patient with me.

S. Whatever you saw—up there—disturbs you. That's one reason why I want to know what it was. But what the hell? If you can handle it alone—do. That's the idea, after all. My curiosity is my problem, not yours. Listen. Let's forget talking. Let me read you this article in *Science*. Your Colonel Wood gave it to me, said you might be interested. I was. It's on what they found inside the Argentinean meteorite. The authors are suggesting we go comb the meteor belt for remnants of a trans-stellar fleet that came to grief in our solar system about six hundred million years ago. They would have landed on Mars first, of course. Are these guys nuts?

H. I don't know. Read the article.

TEMSKI slept heavily and it was easy for Shapir to insert ordinary wax plugs like those insomniacs use into his ears while he was asleep. When Temski woke he did nothing unusual at first. He sat up, yawned, stretched, scratched, looked lazily around to see if anything to eat was handy, in that serene way Shapir privately felt was altogether unlike any psychotic behavior he had ever seen and, in fact, unlike any human behavior he had ever seen. Temski reminded him of a healthy, poised, contented, tame animal. Not a chimpanzee—something milder, more contemplative. An orang, maybe.

But the orang began to feel uncomfortable.

Temski looked around, left and right, nervous. Perhaps he was not looking but moving his head, trying to find the vanished sounds. The lost chord, Shapir thought. Temski grew more and more disturbed and alert. He stood up, still turning his head restlessly. He looked across the room. For the first time in seventeen days of daily contact he saw Shapir.

His handsome face was now contorted with anxiety and bewilderment.

"Where?" he said. "Where—"

His hands, groping at his ears to find the cause of silence, found the earplugs and removed one. That was enough. "Ah," he said and stood still. His eyes were still directed toward Shapir, but he did not see him. His face relaxed.

Later attempts were more successful. Though bewildered at first, Temski was cooperative while artificially deafened, and responded readily to Shapir's attempts to communicate with him by touch, by sign, and finally by writing. After the fifth such session, Temski consented to longer sessions involving the use of a drug which would deaden his auditory nerve endings for about five hours at a time.

During the second of these long periods he asked to see Hughes. Shapir had already been instructed to let the two astronauts talk together if

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possible—there was a feeling that such a meeting might elicit more information if they talked freely to each other. It was necessary for Hughes to write, since Temski was artificially deafened. Hughes knew touch-typing and carried on his part of the dialogue on a portable typewriter. Not all the material found in the wastebasket, however, could be successfully collated into the tape of Temski's spoken conversation. The two men mostly discussed the return journey and Commander Rogers' illness and death, which Temski could not recall. Hughes described all these events as he had done before, without adding new information. They did not talk about the "room" (Site D) or their respective disabilities, except as follows:

T. It's not inside, is it?

H. If it was, earplugs wd improve yr reception.

T. It's real, then.

H. Hell, yes.

T. See, when they first stuck those plugs in my ears, when I woke up and there was this silence, I was really spooked. It took me a long time to come back from where I'd been. And I didn't much want to come back. But when Shapir began telling me how long it had been and I realized this was Earth—you know, that's what spooked me—I thought, maybe all this has been some sort of like hallucination. You know. Jesus, have I been off my chump? That scared me. Like I was two different people. But I began to put it together, to see that it wasn't a split, but a . . .

H. Change.

T. Exactly. It changed me—it had changed me. It's real. Because when I *can* hear that's what I hear. And when you can see, that's what you see. Right? In other words, it is real. We have to be artificially blinded and made deaf to *not* hear it and see it. That's it, isn't it?

(Hughes' typed responses for the following section were not identifiable in the wastebasket material.)

H. . . .

T. Oh, no. Beautiful. It took me a long time—at least I know now it was a long time—to begin to get it. At first it didn't make any sense—Jesus, it scared the balls off me at first. You or Dwight would say something and there'd be these kind of chords all around your voice, like rainbows around a prism so you can't even see the prism—yeah, that's what it's like for you, isn't it? It's the same, only this is with hearing. It's like everything turns into this music, only it isn't music. It's . . . At first, like I said, I didn't know how to hear it. I thought it was something wrong with my suit radio! Jesus! (Laughs) I couldn't

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follow the patterns, you know, the modulations, like, the transformations. It was all so different. But you learn. The more you listen the more you hear. I wish you could hear it. You know, you tell me it's two months since we left Mars and so on—and shit—I believe you, but it doesn't matter. It really doesn't matter—does it, Gerry?

H. . . .

T. I wish I could *see* it, the way you do. It must be tremendous. But I'll tell you, I'm glad they pull me out of it like this every day now. I think it's meant to be that way. I was kind of—I don't know—swamped, overwhelmed—it's too much. We're not built right, not quite strong enough, maybe. At least at first. Can't take it all at once. What I'd like to try to do while I'm out of touch is try to write some of it down.

H. . . .

T. No. I don't. But it wouldn't have to be music. See, it isn't music—that's just like a way of describing it because it's beautiful. I think I could get it into words just as well. Maybe better. To say what it means.

H. . . .

T. Afraid of what?

III

BERNARD DECELIS and his wife called Hughes every couple of days on the telephone, though they were prevented by the quarantine from coming to see him. On the 27th of July Hughes and Decelis had a significant conversation concerning the so-called "room," Site D, of the Psyche XIV survey. Decelis said, "If I don't get on the Sixteen team and *see* that damned place, I'll flip."

"Seeing is believing," Hughes remarked. He was not as excitable as he had been earlier, tending to be terse and rather bitter.

"Listen, Gerry. Was there ever machinery in those pigeonholes?"

"No."

"Hah! There's a definite answer! I thought you wouldn't assert anything about Site D except its incomprehensibility to the human mind. You softening up?"

"No. Learning."

"Learning what?"

"How to see."

After a pause Decelis asked cautiously, "See what?"

"Site D. Since it's all I can see."

"You mean, that's what you—when your eyes are open—"

"No." Hughes spoke wearily and with reluctance. "It's more complex than that. I don't see Site D. I see . . . the world in the light cast by Site D. . . a new light. The man you ought to ask is Joe Temski. Or, listen, did you ever run the pigeonholes through Algie, like you said?"

"I had trouble setting up the program."

"I'll bet you did," Hughes said with a short laugh. "Send the stuff

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here. I'll set it up. Blindfolded."

TEMSKI came into Hughes' room, radiant. "Gerry," he said, "I've got it."

"Got what?"

"I've got it together. I heard you. No, I wasn't lip-reading. Say something with your back turned. Go on!"

"Ptomaine poisoning."

"Ptomaine poisoning. Okay? See, I'm hearing you. But I haven't lost the music. I've got it all together!"

Blue-eyed and fair, Temski was ordinarily a handsome man—now he was magnificent. Hughes could not see him (though the spy camera in the ventilator grille could and did), but he heard the vibration of his voice and was moved—and frightened.

"Take off your blinkers, Gerry," the gentle, vibrant voice said.

Hughes shook his head.

"You can't sit in the dark inside yourself forever. Come out. You can't choose blindness, Gerry."

"Why can't I?"

"Not after you've seen the light."

"What light?"

"The light, the word, the truth we have been taught to perceive and to know," Temski said, with the gentleness of utter certainty and a warmth in his voice, a warmth like sunlight.

"Get out," Hughes said. "Get out, Temski!"

TWELVE weeks had passed since Psyche XIV splashdown. Nobody in the debriefing staff had come down with any symptoms more alarming than boredom. Hughes was no worse and Temski was now completely recovered. It could be safely assumed that whatever had affected the crew of Psyche XIV, it had not been an infection vectored by a virus, spore, bacterium, or other physical agent. The hypothesis accepted tentatively and with various reservations by the majority, including Dr. Shapir, was that something in the arrangement of the elements constituting the "room," Site D, had, during their prolonged and intense study of the site, caused a degree of brain-wave disruption in all three men, analogous to the brain-function disturbance caused by strobe lights at certain frequencies, etc. Precisely what elements of the "room" were involved was not yet known, though the holographs were being examined intensively by experts. Psyche XV was to make a still more thorough investigation of the site, taking due precautions to protect and monitor the astronauts.

These suspect elements of Site D were so numerous and so intricately interrelated that it was very hard for a single mind to attempt to arrange or order them. Some Martianologists were sure the peculiar properties of the "room" were only a geological accident and that all the "room" had to "tell" us was the kind of information furnished so concisely and beautifully by the strata of rocks, the rings of a tree, the lines of a spec-

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trum. Others were as convinced that intelligent beings had built the City and that in studying it we might learn something of their nature and the way their minds worked—those unimaginable minds of 600 million years ago (for the radioactive-decay dating of the site was absolutely definite now). The job of doing so, however, was daunting. T. A. Newman of the Smithsonian Institution put it well: "Archeologists are used to getting a lot of information out of very simple things—potsherds, bits of flint, a wall here, a grave there. But what if all we had of an ancient civilization were a very complicated thing, complicated in more than a technological sense—let's say, one copy of Shakespeare's *Hamlet*. Now let's assume that the archeologists who find this copy of *Hamlet* are not humanoid, don't have books, don't have plays, don't speak, write or think at all as we do. What are they going to make of that little physical artifact, the evident complexity and purposefulness of it, the repetition of certain elements and the non-repetition of others, the semi-regularity of line lengths and so on? How are they going to read *Hamlet*?"

To those who accepted the "Hamlet theory" the obvious first step was to employ computers, and a number of them had been set to work analyzing the various elements of Site D: the spacing, size, depth and configurations of the "pigeonholes," the proportions of the first, middle, and third "subchambers," the extraordinary acoustical properties of the "room" as a whole. None of these programs had as yet produced any sure evidence of conscious planning or rational pattern—none, that is, except the program set up by Decelis and Hughes on NASA's new Algebraic V, which had certainly gotten results, though they could not be called rational. Indeed that printout had given a shudder to the NASA brass, and a good laugh to those few scientists to whom Decelis had shown it before it was suppressed as being probably a fraud and certainly an embarrassment. The entire printout read as follows:

RUN
PIGEONHOLES SITE D MARS SECTOR NINE
DECELIS HUGHES
GOD
GOOD GOD GOD GOOD YOU ARE GOD
RESET
RESET TOTALITY COMPREHENSION NONSENSE
PERCEIVE NONSENSE NO SENSE REAL GOOD GOD
PERCEIVE RECEIVE DIRECTIONS DIRECTION
PROCEED INFORM UNINFORMED
GOD GOD GOD GOD GOD GOD
END RUN

SHAPIR came in to find Hughes lying on the bed, as he now did most of the time, wearing his black

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goggles. He looked white and ill.

"I think you've been overdoing it."

Hughes did not answer.

Shapir sat down. "They're sending me back to New York," he said presently.

Hughes did not answer.

"Temski's been released, you know. He's on his way to Florida now. With his wife. I can't find out what is being planned for you. I asked . . ." After a long pause he completed the sentence. "I asked for another two weeks here with you. No go."

"It's all right," Hughes said.

"I want to keep in touch with you, Geraint. Obviously we can't write letters. But there's the phone. And tapes—I'm leaving a cassette recorder here with you. When you want to talk, please call me. If you can't get me, talk to the recorder. It's not the same, but—"

"You're a very good man, Sidney," Hughes said gently. "I wish . . ." After a moment he sat up. He reached up to his face and took off the black goggles. They fitted so close around his eyesockets that it took him a little while. When they were off he lowered his hands and looked across the room, directly at Shapir. His eyes, the pupils enlarged by long privation of light, were almost as dark as the goggles.

"I see you," he said. "Hide and seek. I spy. You're It. Do you want to know what I see?"

"Yes," Shapir said softly.

"A blot, a shadow. An incompleteness, a rudiment, an obstruction. Something completely unimportant. You see, it doesn't do any *good* to be a good man, even . . ."

"And when you look at yourself?"

"The same. Just the same. A hindrance, a triviality. A blot on the field of vision."

"The field of vision. What is the field of vision?"

"What do you think?" Hughes said, quietly and wearily. "What is true vision of? Reality, of course. I have been reprogramed to perceive reality, to see the truth. I see God." He sank his face into his hands, covering his eyes. "I was a thinking man," he said. "I tried to be a rational man. But what good's reason, when you can *see* the truth? Seeing is believing . . ." He looked up again at Shapir, his dark eyes both piercing and unseeing. "If you want a real explanation, go ask Joe Temski. He's keeping quiet now—he's biding his time. But he's the one who can tell you. And he will when his time comes. He can translate what he hears—translate it into words. It's harder to do with visual perceptions. Mystics have always had trouble putting their visions into words; except the ones that got the Word, that heard the Voice. They usually got right up and acted, didn't they? Temski will act. But I will not. I refuse. I will not preach. I will not be a missionary."

"A missionary?"

"Don't you see? Don't you see

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that's what the 'room' is? A training center, a briefing room– a–"

"A religious center? A church?"

"Well, in a way. A place where you are taught to see God and hear God and know God. And love God. A conversion center. A place where you're converted! And then you want to go out and preach the knowledge of God to the others–to the heathen. Because now you know how blind they are–and how easy it is to see. No, not just a church, a mission. The Mission. And you learn The Mission and you come out of it with The Mission. They weren't explorers. They were missionaries, bearing the truth, bringing it to the other races and the future races, all the poor damned heathens living in the outer darkness. They knew the answer and they wanted us all to know it. Nothing else matters, once you've learned it. It doesn't matter if you're a good man or a bad one, if I'm an intelligent man or a fool. Nothing about us matters except that we are trivial vehicles of the great truth. Earth doesn't matter, the stars don't matter, death doesn't matter, nothing is anything. Only God is."

"An alien god?"

"Not a god. God–the one true God, immanent in all things. Everywhere, forever. I have learned to see God. All I have to do is open my eyes and I see the Face of God. And I'd give all my life just to see one human face again, to see a tree, just a tree, a chair–a plain wooden chair, ordinary– They can keep their God, they can keep their Light. I want the world back. I want questions, not the answer. I want my own life back and my own death!"

ON THE recommendation of the Army psychiatrist who undertook the case of Geraint Hughes after Shapir was dismissed, Hughes was moved to a military hospital for the insane. As he was generally a quiet and cooperative patient he was not kept under strict supervision and after eleven months of confinement he unfortunately carried out a successful suicide attempt, slashing his wrists with a spoon handle which he had stolen from the mess hall and sharpened by rubbing against the bed frame. It is an interesting fact that he killed himself on the day the Psyche XV Mission started back to Earth from Mars, bringing the documents and records which, as interpreted by the First Apostle, now form the first chapters of the Revelation of the Ancients, the sacred texts of the holy and universal American Church of God, bringer of light to the heathen, sole vehicle of the One Eternal Truth.

O fools (said I) thus to prefer dark night
Before true light . . .
But as I did their madness so discuss
One whisper'd thus,
This Ring the Bride-groome did for none provide
But for his bride. ★

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GALAXY BOOKSHELF

Theodore Sturgeon

IT IS, and always has been, the practice of this department to give attentive treatment to anything that comes its way, no matter how it's bound or who publishes it. As a matter of fact, the chance to do this was the heaviest persuasion in my undertaking at all what is sometimes a worrisome, time-consuming responsibility. The more I read reviews, the more apalled I became at the inability, the downright snobbish refusal of "serious" critics to take seriously that which appeared first in soft covers. It is easy to concede that a great many original paperbacks are just awful; it is odd that one must not concede, but assert, that a great many original hardcovers are also awful. Such a posture puts me to a great deal more trouble, perhaps, I might have to bear if I yielded to snobbery, but it has its rewards. A reviewer has something in common with the school teacher whose real payoff isn't salary-and-fringe, but the ignition in that one in a—hundred? thousand?—bored faces of the fire that first flamed in the teacher when he or she felt first-love for the subject taught. Every once in a while, out of the bushels of books and galleys decanted on my doorstep, comes that waited-for, hoped-for gush of warmth and light, and it's as likely to radiate from the paperbacks as anywhere else. Cases in point:

Mister Justice (Ace Double, 95¢) by Doris Piserchia, a first novel well worth looking for—or sending for if you can't find it on the racks. This is by no means a perfect novel—I'd give

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anything to see that ending reworked—but never mind that: really, never mind. Ms. Piserchia writes with a lean and powerful style—her pace and her characterizations are dimensional, spellbinding. She deals with a superman capable of a limited form of time travel, who can go back to the time and place of a crime and photograph it, document the supporting evidence and then, in present-time, capture the criminal and deliver the whole package to the authorities. When the authorities won't take action he does—he becomes an executioner. As can be predicted, there are those dedicated to his elimination for a wide variety of reasons. In the larger matrix, early 21st Century America is falling apart and as chaos approaches the hunt goes on. The violence and sex in this novel are shattering—and never overdone, never outside the legitimate advancement of the plot. I'm going to hang this one on my Hugo hook for this year and there it will stay unless something better comes along to knock it off. Meanwhile, welcome Ms. Piserchia.

On the flip side of this double is *Hierarchies,* by John T. Phillifent, fast and fun if you like rescue-the-damsel adventure stuff.

THE EARTH TRIPPER (Fawcett, 75¢) is Leo P. Kelly's second novel (he wrote *Mindmix*) and he has here a most captivating, multifaceted narrative of an extraterrestrial "passing" as a human being, yet operating among humans with complete honesty, which makes him, to say the least, troublesome. He winds up on a funny-farm and the events and characters therein are comic, touching, poignant and astonishing. There are, in the narrative and dialogue, some profound commentaries and insights on the human animal, what he is and does—and occasionally some truly beautiful passages. Kelly can, if he keeps up with this sort of thing, become one of those writer's writers who make other writers want to be file-clerks.

IN THE ENCLOSURE (Avon, 95¢) by Barry N. Malzberg is another tense, puzzling and acidulous work by this unfailingly surprising writer. I look forward eagerly to his byline, snatch joyfully at it when I see it and he has never let me down. This one runs less to the special scorn that has become his hallmark, and more to a poignant, painful lostness which is genuinely touching. Why is this man in The Enclosure forced daily to give up technical information to a ravenous Earth? Who sent him? Why must he answer whatever is asked of him? Who programed him? What for? Why can't the Earth people under-

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stand that pressure and even torture are not necessary? Why do they torture him so? And there's Nala. Why, when she figures out the answers, won't she tell him? Finally the answers are all neatly there for you and not since D. G. Compton's *Farewell, Earth's Bliss* has there been such a sting in a novel's tale.

You find the warm glow and the great light in some non-fiction, too. Isaac Asimov's many, many collections of short pieces have engaged, instructed and amused me for a lot of years and I am never without one or some of them within reach. Of them all, however, his latest, *Today and Tomorrow And...* (Doubleday $6.95) is his most potent, pungent and serious. It is beautifully organized. Articles originally printed in a wide variety of publications—*International Wildlife, Intellectual Digest, The Ladies' Home Journal, Private Pilot, The Smithsonian, True, Electronic Age,* and others, are brought together neatly and demonstrate fully the true value of this remarkable writer—namely, that he can talk to anybody. Look at that spread. How much cross readership do you suppose there is between and among these publications? Essays of great moment to everyone are so often buried in some specialized outlet or other. Asimov is the synthesizer, the great interface, and in this book he talks to all these specialists—and to you—about things that have to matter to us all. I say again: things that have to matter... for in this book is Asimov's article (actually one version of an essay he sold all over the magazine stands a couple of years ago) called *The End.* In it he makes very clear that we have, perhaps, thirty years left. He says it clearly and succinctly and without hysteria; then he follows it with another essay called *The End, Unless*—in which he outlines those things which must be done if our species is to endure. He says in an afterword that this kind of thing makes some people call him a "doomcrier." But, "When I see doom," he says cheerfully, "I intend to cry it." The shapeliness of this book is beautiful to behold. "Today" is a section on biology, chemistry, astronomy and physics. "And Tomorrow" is the future of the space effort, the Earth, and science fiction. Finally, "And...", fully a third of the book in impact, but only a tiny few hundred words long, tells who it is that can do something about it. It rings. It tolls. Read it.

ON NOVEMBER 12, 1971, on the eve of the arrival to Mars orbit of the superbly successful Mariner 9, five men gathered on the Caltech campus to speak of what it meant—and further, what it meant to them. Two were scientists deeply involved in current space efforts. One

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was the science reporter for the *New York Times*. Two were science fiction writers. . .when I was in the West Indies I heard a native phrase: "Would God I were a fly on de wall fe see dat!" and I wish I could have been, for the men were Carl Sagan, Bruce Murray, Walter Sullivan, Ray Bradbury and Arthur C. Clarke. Their remarks were recorded and then, a whole year later, were given to them to read over so that each might write a second take, a later thought. These, together with 50 photographs of Mars, surely the most astonishing ever seen by mankind, are the contents of *Mars and the Mind of Man* (Harper and Row, $7.95.) There are only 96 pages . . . but the book is unique and I think you need it.

AT LAST we have a novel from the gentle, colorful Laurence Yep. It's called *Sweetwater* (Harper & Row, $5.50) and is packaged as a juvenile "Ages 10 up." Well, you know about sf juveniles by really good writers like "Paul French" and Robert Heinlein, don't you? They're a hell of a lot better than a lot of so-called "adult" releases. (Parenthetically, Edith Efron recently wrote a series for *TV Guide* about the new breed of children's programs and the fact that a great many kids dial away from them and hang fixated on the "adult" shows—why? Clearly, because the latter were written for children in the first place!) Anyway, this one deserves to stand shoulder to shoulder with Panshin's *Rite of Passage* and, where it deals with music, with Edgar Pangborn. There is no higher praise than that. So live for a while in the half-drowned city of Old Sion on the multi-mooned planet Harmony and learn how the Silkies live their harsh and homey life and how young Tyree turns into a man.

MOORCOCK . . . what do you say about Michael Moorcock? Wild man, maybe. Troublemaker. Maker of waves—New Waves. The man who wrote *Behold the Man* and scalded me. Turns the crank and out comes thud and blunder, turns around and writes a magazine piece the very title of which gets his magazine banned—and it partly funded by the government that banned it. Writes like an angel, but then, whose angel? Anyway, he's into something called "The Dancers at the End of Time," which is a trilogy, of which the first volume is *An Alien Heat* (Harper and Row, $4.95). Seems, these days, like a fair price—a little less so when you find out it's only 158 pages. Yet I don't complain specifically about that—only that I couldn't put the book

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down and the end came so unexpectedly that it broke my stride . . . you know, like when you run up seven steps but the man built only six in the flight. This kaleidoscope, this chiaroscuro of a book, in which anything can happen because within its parameters anything really can, deals with a society so incredibly—correction—credibly decadent that it has produced, for statistical reasons (it's already done everything else) a genuine innocent. Jherek Carnelian is intelligent and quite sincere, but quite guileless. How he involves himself with a for-real Victorian lady who has been kidnaped from her time, how she is returned, how he follows her and what happens to him there—this is tale-telling of the highest order. It carries the several bonuses of language under masterly control, a mordant, Puckish view of humans and their institutions, their vanities and their appetites, and with an especially long, especially sharp needle, has at the practice of research. And oh, wait until you meet some of Jherek's contemporaries . . . I'm glad to have encountered all this, but I think I would have been pleased to wait a little longer for the whole thing rather than suffer this attack of go-read-us interruptus.

IF YOU get trapped into buying a book called *A Peep Into the 20th Century* (Ballantine, $1.25) because you think it's sf (I did)—well, it isn't, which is not at all Ballantine's fault. Probably, then, I shouldn't mention it at all, except that it's a serendipity, a beautifully written, meticulously researched narrative of the first man to be killed by an electric chair. If you happen to see it, look on pp. 53 et seq., for one of the most profound arguments against capital punishment you will ever read. Christofer Davis wrote the book and the man really can write. In 1965 Ace brought out a John Brunner novel called *Day of the Star Cities.* Now it's back, substantially revised and enlarged, as *Age of Miracles* (Ace, 95¢). A chunky, competent book, it plods a bit from time to time but does well with new idea-variants and especially with the alienness of the aliens . . . Is there anyone out there who hasn't read John Sladek's utterly outrageous *The Muller-Fokker Effect?* It's out in paperback (Pocket Books, 95¢) . . . Gordon Dickson's 1970 collection, *Danger—Human,* is out in paperback as *The Book of Gordon Dickson* (DAW, 95¢.) He writes with enormous competence and in this collection are two of my own great favorites, *Dolphin's Way* and *Lulungomeena,* as well as eleven others. Good book . . . Just received: the new Heinlein. I promise you a careful takeout in my next.

★

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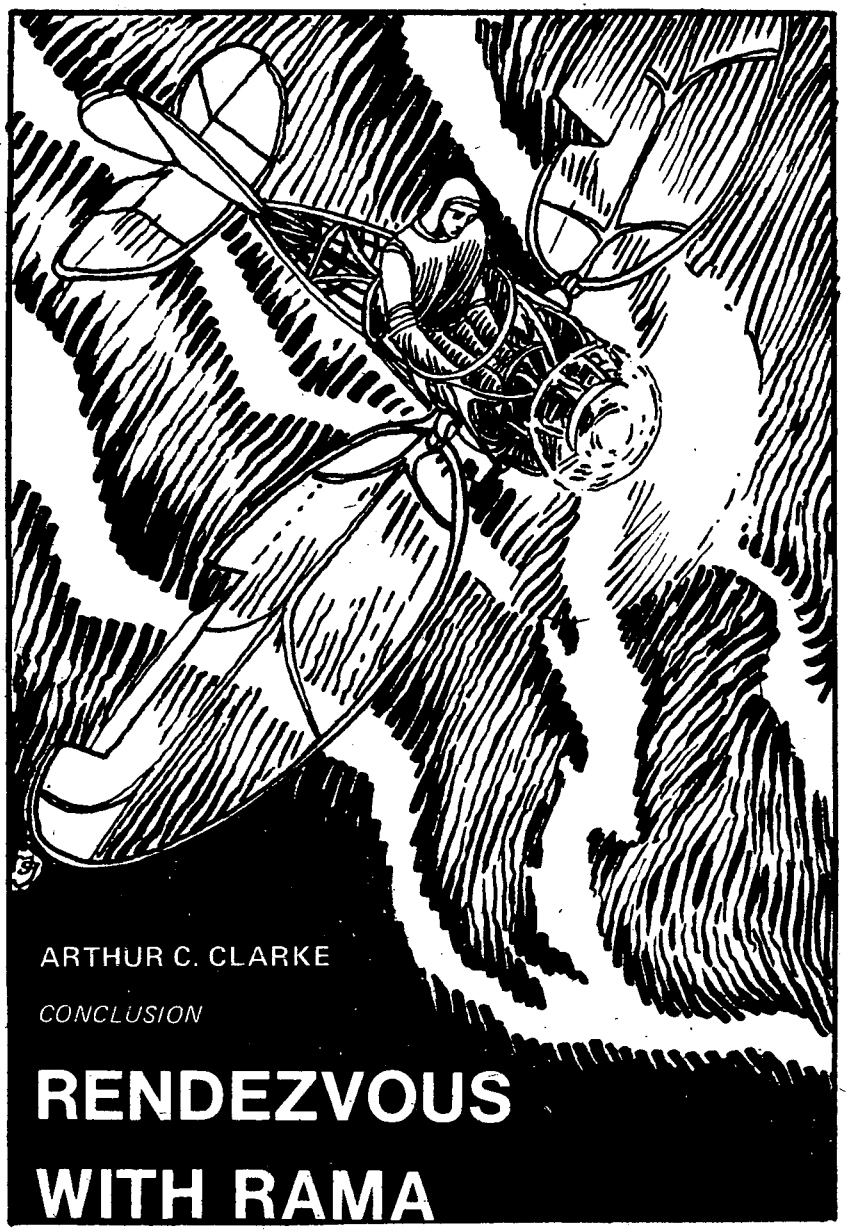

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WHAT HAS GONE BEFORE

The year 2131 marked the first computer sighting of Object 31/439, a massive body 40 kilometers in diameter and estimated to weigh 10 million million tons, hurtling toward Earth's solar system. At first little attention was paid to it beyond automated observation and tracking by orbiting Spaceguard computers. These, however, alerted humans when 31/439 displayed characteristics unusual for asteroids—one of which was its spin velocity of 1000 km/h, giving it a 4-minute "day."

Solar Survey Research Vessel Endeavor, *5000 tons*—Commander William Tsien Norton, *an Earth/Mars citizen with separate wives and families on each planet—was diverted from its routine mission of checking and emplacing asteroid warning beacons to investigate.*

The new arrival proved to be an artifact, cylindrical in shape and spinning on a longitudinal axis. Commander Norton *effected a landing on the approximately flat "North Pole" of the cylinder and, during first EVA, he and an aide,* Lieutenant-Commander Karl Mercer, *discovered locks leading to the object's interior.*

Earth and her planetary colonies, bound into a loose federation (United Planets, headquartered on Luna) were electrified. Astronomers, having exhausted their store of Greek classic names on the approximately 1000 listed asteroids, reached into Hindi to rename Object 31/439 Rama. *A* Rama *Committee, consisting of United Planets representatives from Mercury, Earth, Luna, Ganymede, Titan and Triton, plus leading scientists, was formed on Luna to correlate the gathering of more information regarding the intruder.*

Commander Norton *and his crew found unobstructed entry into* Rama *through three airlocks guarding a half-kilometer tunnel. The interior of* Rama *was dark, cold and lifeless, but flares revealed an inside-out world of land and water and citylike constructs . . . Searchlights set up at the Hub of* Rama's *spin confirmed these first impressions, adding detail.*

The domelike interior of the point of access, the "North Pole," was trisected by equidistant, radiating ladders, connecting with stairways leading to a cylindrical plain that ran around the inner surface of Rama. *The plain was bisected by what the explorers dubbed the Cylindrical Sea. The sea appeared frozen. A feature of it was an island roughly the shape of Manhattan, supporting what seemed to be an urban complex the explorers named New York. Other structural clusters dotted the plain and became Rome, Paris, London, Peking, Moscow, Tokyo—each was about the size of an Earth city housing 50,000 humans. What seemed to be roads and rails linked the "cities."*

Another major feature of Rama's *interior was the southern shore of the Cylindrical Sea, which seemed to be an unbroken, unscalable cliff a half-kilometer high, while the northern shore rose a roughly uniform fifty meters above water level. Also, evenly spaced along the length and circumference of the plain were uniform depressions (Straight Valleys) apparently floored with some translucent, hard substance.*

After solving problems of direc-

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tional orientation (save along the airless, no-gravity axis of Rama's *spin, all directions from the Hub could be either up or down) explorers selected from* Endeavor's *crew utilized the ladders and stairs radiating from the Hub to reach the plain, their progress lighted by Hub-based spotlights. They discovered breathable air and gravity fit for humans, thus were able to continue further exploration without space-suits. No signs of life were evident, however—the silence of* Rama *was reported as more profound than human senses had ever encountered.*

But as Rama *penetrated deeper into the solar system and the sun's warmth reached her, small breezes began to break the stillness—and suddenly the translucent floors of the Straight Valleys burst into sun-like brilliance, flooding the world of* Rama *with light. The ice melted in the Cylindrical Sea and the oxygen content of the atmosphere increased until the air became breathable even along the axis of spin.* Rama *seemed to be coming awake to the guiding intelligence that had sent it on its timeless journey. Consternation was expressed among members of the* Rama *Committee—the Hermians were particularly concerned. The committee's scientists had already deduced that the banks of the Cylindrical Sea had been designed to permit either rapid acceleration or gradual braking of* Rama's *speed—it was now calculated that the alien artifact had the capability to brake into an orbit around the sun from which it would dominate not only Mercury but the entire solar system.*

The Cylindrical Sea yielded evidence that life was being born in its waters—and suddenly it became imperative for humans to solve the mystery of Rama. Commander Norton *and a hand-picked crew set out to explore New York in a makeshift raft named* Resolution.

IT WAS not a city—it was a machine. Norton had come to that conclusion in ten minutes and saw no reason to change it after making a complete traverse of the island. A city—whatever the nature of its occupants—surely had to provide some form of accommodation; there was nothing here of that nature, unless it was underground. And if that were the case, where were the entrances, the stairways, the elevators? He had not found anything that even qualified as a simple door.

The closest analogy he had ever seen to this place on Earth was a giant chemical processing plant. However, there were no stockpiles of raw materials, or any indications of a transport system to move them around. Nor could he imagine where the finished product would emerge—still less what that product could possibly be. It was all very baffling and more than a little frustrating.

"Anybody care to make a guess?" he asked at last of all who might be listening. "If this is a factory, what does it make? And where does it get its raw materials?"

"I've a suggestion, skipper," said Karl Mercer, over on the far shore. "Suppose it uses the sea. According to Doc, that contains just about anything you can think of."

It was a plausible answer and Norton had already considered it.

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Buried pipes might well lead to the sea—in fact, some had to. Any conceivable chemical plant would require large quantities of water. But he had a suspicion of plausible answers—they were so often wrong.

"That's a good idea, Karl. But what does New York *do* with its seawater?"

For a long time nobody answered from ship, Hub or northern plain. Then an unexpected voice spoke.

"That's easy, skipper. But you're all going to laugh at me."

"No, we're not, Ravi. Speak right up."

Sergeant Ravi McAndrews, chief steward and simp master, was the last person on this ship who would normally become involved in a technical discussion. His I.Q. was modest and his scientific knowledge was minimal, but he was no fool and had a natural shrewdness everyone respected.

"Well, it's a factory all right, skipper, and maybe the sea provides the raw material—after all, that's how it all happened on Earth. I believe New York is a factory for making—Ramans."

Somebody somewhere snickered, but became quickly silent and did not identify himself.

"You know, Ravi," said his commander at last, "that theory is crazy enough to be true. And I'm not sure if I want to see it tested—at least, until I get back to the mainland."

This celestial New York was just about as wide as the island of Manhattan, but its geometry was totally different. There were few straight thoroughfares. The layout was a maze of short, concentric arcs, with radial spokes linking them. Luckily, it was impossible to lose one's bearings inside *Rama*—a single glance at the sky was enough to establish the north-south axis of the world.

The team paused at almost every intersection to make a panoramic scan. When all these hundreds of pictures were sorted out it would be a fairly straightforward—if tedious—job to construct an accurate scale model of the city. Norton suspected that the resulting jig-saw puzzle would keep scientists busy for generations.

Getting used to the silence here was even harder than it had been out on the plain of *Rama*. A city-machine should make some sound—yet there was not even the faintest of electric hums, or the slightest whisper of mechanical motion. Several times Norton put his ear to the ground or to the side of a building and listened intently. He could hear nothing except the pounding of his own blood.

The machines were sleeping—they were not even ticking over. Would they ever wake again and for what purpose? Everything was in perfect condition—it was easy to believe that the closing of a single circuit in some patient, hidden computer would bring the whole maze to complex life.

When at last they had reached the far side of the city they climbed to the top of the surrounding levee and looked across the southern branch of the sea. For a long time Norton stared at the five-hundred-meter cliff that barred them from almost half of *Rama*—and, judging from their telescopic surveys, the most complex and varied half. From this angle it appeared an ominous, forbidding black—he found himself thinking of

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it as a prison wall surrounding a whole continent. Nowhere along its entire circle could he see a means of scaling it.

He wondered how the Ramans reached their southern land from New York. Probably an underground transport system ran beneath the sea, bit they would have had to have aircraft as well. There were many open areas here in the city that could be used for landing. To discover a Raman vehicle would be a major accomplishment, especially if they could learn to operate it—though could any conceivable power source still be functioning, after several hundred thousand years? There were numerous structures that had the functional look of hangars or garages, but they were all smooth and windowless, as if they had been sprayed with sealant. Sooner or later, Norton told himself grimly, he would be forced to authorize the use of explosives and laser beams, but he was determined to put off this decision to the last possible moment.

His reluctance to use brute force was based partly on pride, partly on fear. He did not wish to behave like a technological barbarian, smashing what he could not understand.

As for his fear—perhaps that was too strong a word. Apprehension might fit better. The Ramans seemed to have planned for everything—he was not anxious to discover the precautions they had taken to guard their property. When he sailed back to the mainland, it would be with empty hands.

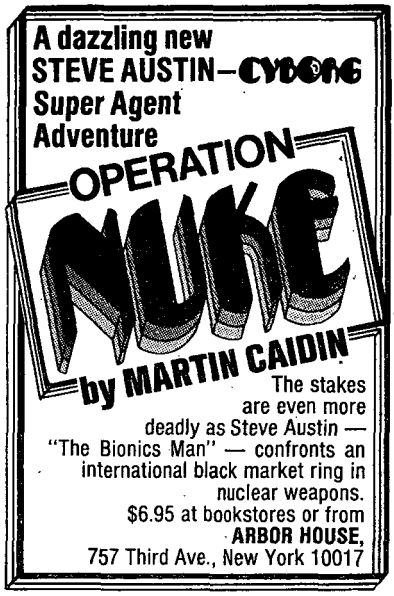
LIEUTENANT JAMES PAK was the most junior officer on board *Endeavor* and this was only his fourth mission into deep space. He was ambitious and due for promotion. He had also committed a serious breach of regulations and was openly hesitant when he asked the captain for a private meeting.

Norton wondered, as he studied the uncertain expression on the young officer's face, what the problem was this time. He remembered his delicate interview with Boris Rodrigo, but this wouldn't be anything like that. Jimmy was not the religious type. The only interests he had ever shown outside his work were sports and sex, preferably combined.

"Well, Jimmy, what is it?"

"I have an idea, Commander. I know how to reach the southern continent—even the South Pole."

"I'm listening. How do you propose to do it?"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"Ah—by flying there."

"Jimmy, I've had at least five suggestions that we do so—more, if you count crazy suggestions from Earth. We've looked into the possibility of adapting our spacesuit propulsors, but air drag would make them hopelessly inefficient. They'd run out of fuel before they could go ten kilometers."

"I know that. But I have the answer."

Lieutenant Pak's attitude was a curious mixture of complete confidence and barely suppressed nervousness. Norton felt baffled. What was the kid worried about? Surely he knew his commanding officer well enough to be certain that no reasonable proposal would be laughed at.

"Well, go on. I'll see that your promotion is retroactive if it works."

That didn't go down as well as he had hoped. Jimmy gave a sickly smile, made several false starts, then decided on an oblique approach to the subject.

"You know, Commander, that I was in the Lunar Olympics last year."

"Of course. Sorry you didn't win."

"It was bad equipment—I know what went wrong. I have friends on Mars who've been working on it, in secret. We want to give everyone a surprise."

"Mars? But I didn't know—"

"Not many people do. The sport is still new there—it's only been tried in the Xante Sportsdome. But the best aerodynamicists in the solar system are on Mars—if you can fly in that atmosphere, you can fly anywhere." Lieutenant Pak paused. Then: "My idea was that if the Martians could build a good machine, using all their know-how, it would really perform on the moon where gravity is only half as strong."

"That seems plausible, but how does it help us?"

Norton was beginning to guess, but he wanted to give Jimmy plenty of rope.

"Well, I formed a syndicate with some friends in Lowell City. They've built a fully aerobatic flyer with some refinements that no one has ever seen before. In lunar gravity, under the Olympic dome, it should create a sensation."

"And win you the gold medal."

"I hope so."

"Let me see if I follow your train of thought correctly. A skybike that could enter the Lunar Olympics at a sixth of a gravity would be even more sensational inside *Rama* with no gravity at all. You could fly it right along the axis from the North Pole to the South and back again."

"Yes, easily. The one-way trip would take three hours, nonstop. But of course you could rest whenever you wanted to, as long as you kept near the axis."

"It's a brilliant idea and I congratulate you. What a pity skybikes aren't part of our regular equipment."

Jimmy seemed to have some difficulty in finding words. He opened his mouth several times, but nothing happened.

"All right, Jimmy. As a matter of morbid interest—and purely off the record—how did you smuggle the thing aboard against all regulations?"

"As—ah—'Recreational Stores'."

"Well, you weren't lying. And what about the weight?"

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"It's only twenty kilograms."

"Only! Still, that's not as bad as I thought. In fact, I'm astonished you can build a bike for that weight."

"Some have been only fifteen, but they were too fragile and usually folded up when they made a turn. There's no danger of *Dragonfly* doing that. As I said, she's fully aerobatic."

"*Dragonfly*—nice name. So tell me just how you plan to use her. Then I can decide whether a promotion or a court-martial is in order. Or both."

XVI

DRAGONFLY was indeed a good name. The long tapering wings were almost invisible, except when the light struck them from certain angles and was refracted into rainbow hues. It was as if the skin of a soap bubble had been wrapped round a delicate tracery of aerofoil sections—the envelope enclosing the little flyer was an organic film only a few molecules thick, yet strong enough to control and direct the movements of a 50 kph air flow.

The pilot—who was also the powerplant and the guidance system—sat on a tiny seat at the center of gravity and in a semi-reclining position to reduce resistance. Control was by a single stick that could be moved backward and forward, right and left—the only "instrument" was a piece of weighted ribbon attached to the leading edge, to show the direction of the relative wind.

Once the flyer had been assembled at the Hub, Jimmy Pak would allow no one to touch it. Clumsy handling could snap one of the single-fiber structural members and those glittering wings were an almost irresistible attraction to prying fingers. It was hard to believe that there was really something there.

Commander Norton began to have second thoughts as he watched Jimmy climb into the contraption. If one of the wire-sized struts snapped when *Dragonfly* was on the other side of the Cylindrical Sea, Jim would have no way of getting back—even if he were able to make a safe landing. He, Norton, was also breaking one of the most sacrosanct rules of space exploration by sending a lone man into unknown territory, beyond the reach of help. The only consolation was that Lieutenant Pak would be in full view and communication all the time. The whole crew would know exactly what had happened to him if he did meet with disaster.

Yet this opportunity to explore the southern hemisphere was far too good to miss. If one believed in fate or destiny it would be challenging the gods themselves to neglect the only chance humans might ever have of reaching the far side of *Rama* and seeing at close quarters the mysteries of the South Pole. Jimmy knew what he was attempting far better than anyone in the crew could tell him. This was precisely the sort of risk that had to be taken—if it failed, that was the luck of the game. You couldn't win them all.

"Now listen to me carefully, Jimmy," said Dr. Ernst. "It's very important for you not to over-exert yourself. Remember that the oxygen level here at the axis is still very low. If you feel breathless at any time, stop and hyperventilate for thirty seconds—but no longer."

Jimmy nodded abstractedly as he tested the controls. The rudder-

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elevator assembly, which formed a single unit on an outrigger five meters behind the rudimentary cockpit, came alive under his touch, as did the flap-shaped ailerons halfway along the wing.

"Do you want me to swing the prop?" asked Joe Calvert, unable to repress memories of two-hundred-year-old war movies. He barked, "Ignition—contact—"

Jimmy grinned at him and slowly started to move the pedals. The flimsy, broad fan of the airscrew—also a delicate skeleton covered with shimmering film—began to turn. By the time it had made a few revolutions it had disappeared completely and *Dragonfly* was on her way.

She lifted straight upward—or outward—from the Hub, moving slowly along the axis of *Rama.* When she had traveled a hundred meters Jimmy stopped pedaling. It was strange to see an obviously aerodynamic vehicle hanging in motionless suspension.

"How does she handle?" Norton called.

"Response good, stability poor. But I know what the trouble is—no gravity. We'll be better off a kilometer lower down."

"Now wait a minute—is that safe?"

By losing altitude, Jimmy would be sacrificing his main advantage. As long as he stayed precisely on the axis he—and *Dragonfly*—would be weightless. He could hover effortlessly or even go to sleep if he wished. But as soon as he moved away from the central line around which *Rama* spun, the pseudo-weight of centrifugal force would reappear.

And so, unless he could maintain himself at this altitude, he would continue to lose height—and at the same time to gain weight. It would be an accelerating process that could end in catastrophe. The gravity down on the plain of *Rama* was twice that in which *Dragonfly* had been designed to operate. Jimmy might be able to make a safe landing—he could certainly never take off again.

But he had already considered all this and he answered confidently enough, "I can manage a tenth of a gee without any trouble. And she'll handle more easily in denser air."

In a slow, leisurely spiral *Dragonfly* drifted across the sky, roughly following the line of Stairway Alpha toward the plain. From some angles the little skybike was almost invisible—Jimmy seemed to be sitting in midair, pedaling furiously. Sometimes he moved in spurts of up to thirty kilometers an hour. Then he would coast to a halt before accelerating again. And he was always careful to keep a safe distance from the curving face of *Rama.*

It was soon obvous that *Dragonfly* handled much better at lower altitudes—she no longer rolled, but stabilized so that her wings were parallel to the plain seven kilometers below. Jimmy completed several wide orbits, then started to climb again. He finally halted a few meters above his waiting colleagues and realized a little belatedly that he was not quite sure how to land his gossamer craft.

"Want us to throw you a rope?" Norton asked.

"No. I've got to work this out myself. I won't have anyone to help me at the other end."

He sat thinking for a while, then started to ease *Dragonfly* toward the

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Hub with short bursts of power. When he was only five meters away and the skybike was still moving Jimmy abandoned ship. He thrust himself off toward the nearest safety line in the Hub webwork, grasped it, then swung around in time to catch the approaching bike with his hands. The maneuver was so neatly executed that it drew a round of applause.

"For my next act—" Joe Calvert began.

Jimmy Pak frowned. "That was messy," he said, "but now I know how to do it. I'll take a sticky-bomb on a twenty-meter line—then I'll be able to pull myself in wherever I want to go."

"Give me your wrist, Jimmy," ordered the doctor, "and blow into this bag. I'll want a blood sample, too. Did you have any difficulty in breathing?"

"Only at this altitude. Hey, what do you want the blood for?"

"Sugar level. Then I can tell how much energy you've used. We've got to make sure you can carry enough fuel for the mission. By the way, what's the endurance record for skybiking?"

"Two hours twenty-five minutes, three point six seconds. On the moon, of course—a two-kilometer circuit in the Olympic Dome."

"And you think you can keep it up for six hours?"

"Easily, since I can stop for a rest at any time. Skybiking on the moon is at least twice as hard as it is here."

"Okay, Jimmy—back to the lab, I'll give you a Go/No-Go as soon as I've analyzed these samples. I don't want to raise false hopes—but I think you can make it."

A large smile of satisfaction spread across Jimmy Pak's face. As he followed Surgeon-Commander Ernst to the airlock he called back to his companions, "Hands off, please. I don't want anyone putting his fist through the wings."

"I'll see to it, Jimmy," Norton promised, "that the *Dragonfly* is off limits to everybody—including myself."

THE real magnitude of his adventure did not hit Jimmy Pak until he passed the coast of the Cylindrical Sea. Until now he had been flying over known territory. Barring a catastrophic structural failure, he could always land and walk back to base in a few hours.

That option no longer existed. If he came down in the sea he would probably drown, quite unpleasantly, in its poisonous waters. And even if he made a safe emergency landing in the southern continent, it might be impossible to rescue him before *Endeavor* had to break away from *Rama's* sunward orbit.

He was also acutely aware that the foreseeable disasters were the ones most unlikely to happen. The totally unknown region over which he was flying might produce any number of surprises. What if he met flying creatures who objected to his intrusion? He would hate to engage in a dogfight with anything larger than a pigeon. A few pecks could destroy *Dragonfly's* aerodynamics.

Yet, if there were no hazards, there would be no achievement—no sense of adventure. Millions of men would gladly have traded places with him now. He was going not only where no one had ever been before—

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but where no one would ever go again. He would be the only human being in all of history to visit the southern regions of *Rama.* Whenever he felt fear brushing against his mind he could remember that.

He had now grown accustomed to sitting in midair with the world wrapped around him. Because he had dropped two kilometers below the central axis, he had acquired a definite sense of up and down. The ground was only six kilometers below, but the arch of the sky was ten overhead. The "city" of London was hanging up there near the zenith. New York, on the other hand, was the right way up, directly ahead.

"Dragonfly," said Hub control, "you're getting a little low. Twenty-two hundred meters from the axis."

"Thanks," he replied. "I'll gain altitude. Let me know when I'm back at twenty."

This was something he'd have to watch. There was a natural tendency to lose height—and he had no instruments to tell him exactly where he was. If he got too far away from the zero gravity of the axis, he might never be able to climb back to it. Fortunately there was a wide margin for error, and there was always someone watching his progress through a telescope at the Hub.

He was now well out over the sea, pedaling along at a steady twenty kilometers an hour. In five minutes he would be over New York—already the island looked rather like a ship sailing forever around the Cylindrical Sea.

When he reached New York he flew a circle over it, stopping several times so that his little TV camera could send back steady, vibration-free images. The panorama of buildings, towers, industrial plants, power stations—or whatever they were—was fascinating but essentially meaningless. No matter how long he stared at its complexity, he was unlikely to learn anything. The camera would record far more details than he could possibly assimilate—and one day, perhaps years hence, some student might find in them the key to *Rama's* secrets.

After leaving New York he crossed the other half of the sea in only fifteen minutes. Though he was not aware of it, he had been flying fast over water, but as soon as he reached the south coast he unconsciously relaxed and his speed dropped by several kilometers an hour. He might be in wholly alien territory—but at least he was over land.

As soon as he had crossed the great cliff that formed the sea's southern limit, he panned the TV camera completely around the circle of the world.

"Beautiful!' said Hub control. "This will keep the map-makers happy. How are you feeling?"

"I'm fine—just a little fatigue, but no more than I expected. How far do you make me from the Pole?"

"Fifteen point six kilometers."

"Tell me when I'm at ten—I'll take a rest then. And make sure I don't get low again. I'll start climbing when I've five to go."

TWENTY minutes later the world was closing in upon him. He had come to the end of the cylindrical section and was entering the southern dome.

He had studied it for hours through the telescopes at the other

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end of *Rama* and had learned its geography by heart. But nothing had fully prepared him for the spectacle all around him.

In almost every way the southern and northern ends of *Rama* differed completely. Here was no triad of stairways, no series of narrow, concentric plateaus, no sweeping curve from hub to plain. Instead he saw an immense central spike, more than five kilometers long, extending along the axis. Six smaller ones were equally spaced around it. The whole assembly looked like a group of remarkably symmetrical stalactites hanging from the roof of a cave. Or, inverting the point of view, the spires of some Cambodian temple, set at the bottom of a crater.

Linking these slender, tapering towers and curving down from them to merge eventually in the cylindrical plain, were flying buttresses that looked massive enough to bear the weight of a world. And this, perhaps, was their function, if they were indeed the elements of some exotic drive units, as some had suggested.

Lieutenant Pak approached the central spike cautiously, stopped pedaling while he was still a hundred meters away and let *Dragonfly* drift to rest. He sent back TV images, checked the radiation level and found only *Rama's* very low background. Of course, forces that no human instruments could detect might be at work here, but that was another unavoidable risk.

"What can you see?" Hub control asked anxiously.

"Just Big Horn—" He paused. Then: "Unless you give it a better name that's what I'll call it. It's absolutely smooth—no markings—and the point's so sharp you could use it as a needle. I'm almost scared to go near it."

He was not joking. It seemed incredible to him that so massive an object should taper to such a geometrically perfect point. He had seen collections of insects impaled on pins and he had no desire to meet a similar fate.

He pedaled slowly along it until the spike had flared out to several meters in diameter. Then he stopped again. Opening a small container, he gingerly extracted a sphere about as big as a baseball and tossed it toward the spike. As it drifted away, it played out a barely visible thread.

The sticky-bomb hit the smoothly curving surface—and did not rebound. Jimmy gave the thread an experimental twitch, then a harder tug. Like a fisherman hauling in his catch, he slowly wound *Dragonfly* to the Big Horn until he was able to put out his hand and make contact with it.

"I suppose you could call this some kind of touchdown," he reported to Hub. "Surface feels like glass—it's almost frictionless and slightly warm. The sticky-bomb worked fine. Now I'm trying the mike on it. Let's see if the suction pad holds—it does. I'm plugging in the leads—anything coming through?"

There was a long pause from the Hub. Then: "Not a damn thing, except the usual thermal noises. Will you tap it with a piece of metal? Then at least we'll find if it's hollow."

"Okay. Now what?"

"We'd like you to fly along the spike, making a complete scan every

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half kilometer and looking out for anything unusual. Then, if you're sure it's safe, you might go across to one of the Little Horns. But only if you're sure you can get back to zero gravity without any problems."

"Three kilometers from the axis—that's slightly above lunar gravity. *Dragonfly* was designed for that. I'll just have to work harder."

"Jimmy, this is the captain. I've got second thoughts on that. Judging by your pictures, the smaller spikes are just the same as the big one. Get the best coverage of them you can with the zoom lens. I don't want you leaving the low-gravity region unless you see something that makes you feel you must. Then we'll talk it over."

"Okay, skipper. I'll stay close to Big Horn. Here we go again."

HE FELT he was dropping straight down into a narrow valley between a group of incredibly tall and slender mountains. Big Horn now towered a kilometer above him, and the six spikes of the Little Horns loomed all around. The complex of buttresses and flying arches surrounding the lower slopes was approaching rapidly—he wondered if he could make a safe landing somewhere in that cyclopean architecture. He could no longer land on Big Horn itself, for the gravity on its widening slopes was now too powerful to be counteracted by the sticky-bomb.

As he neared the South Pole he began to feel more and more like a sparrow flying beneath the vaulted roof of some great cathedral—though no cathedral ever built had been even one hundredth the size of this place. He wondered if this were indeed a religious shrine or something remotely analogous, but quickly dismissed the idea. Nowhere in *Rama* had anyone discovered any trace of artistic or spiritual expression—everything was purely functional. Perhaps the Ramans felt that they already knew the ultimate secrets of the universe, and were no longer haunted by the yearnings and aspirations that drove mankind.

That thought was chilling and quite alien to Lieutenant Pak's usual not-very-profound philosophy—he felt an urgent need to resume human contact. He decided it was time he reported his situation back to his distant friends.

"Say again, *Dragonfly*," replied Hub. "We can't understand you—your transmission is garbled."

"Repeat—I'm near the base of Little Horn number six and am using the sticky-bomb to haul myself in."

"Understand only partially. Can you hear me?"

"Yes, perfectly. Repeat, perfectly."

"Please start counting numbers."

"One, two, three, four—"

"Got part of that. Give us beacon for fifteen seconds, then go back to voice."

"Here it is."

Jimmy switched on the low-powered beacon that would locate him anywhere inside *Rama* and counted off the seconds. When he went over to voice again he asked plaintively, "What's happening? Can you hear me now?"

Presumably Hub didn't, because the controller then asked for fifteen seconds of TV. Not until Jimmy had repeated the question twice did the message get through.

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"Glad you can hear us, Jimmy. But something very peculiar is happening at your end. Listen."

He heard the familiar whistle of his own beacon, played back to him over the radio. For a moment the sound was normal, then a weird distortion crept into it. The thousand-cycle whistle became modulated by a deep, throbbing pulse so low that it was almost beneath the threshold of hearing—it was a kind of basso-profundo flutter in which each individual vibration could be heard. And the modulation was itself modulated—it rose and fell, rose and fell with a period of about five seconds.

Not for a moment did it occur to Lieutenant Pak that there was something wrong with his radio transmitter. This was from outside—though what it was and what it meant were beyond his imagination.

Hub was not much wiser, but at least it had a theory.

"We think you must be in some kind of very intense field—probably magnetic, with a frequency of about ten cycles. It may be strong enough to be dangerous. Suggest you get out right away—it may be only local. Switch on your beacon again and we'll play it back to you. Then you can tell when you're getting clear of the interference."

Jimmy hastily jerked the sticky-bomb loose and abandoned his attempt to land. He swung *Dragonfly* around in a wide circle, listening to the sound that wavered in his earphones. After flying only a few meters, he could tell that its intensity was falling rapidly. As Hub had guessed, it was extremely localized.

He paused for a moment at the last spot where he could hear it, like a faint throbbing deep in his brain. So might a primitive savage have listened in awestruck ignorance to the low humming of a giant power transformer. And even the savage might have guessed that the sound he heard was merely the stray leakage from colossal energies, fully controlled, but biding their time.

Whatever the sound meant, Jimmy was glad to be clear of it. Amid the overwhelming architecture of the South Pole was no place for a lone man to listen to the voice of *Rama.*

XVII

AS Lieutenant Pak turned homeward, the north end of *Rama* seemed incredibly far away. Even the three giant stairways were barely visible as a faint *Y* etched on the dome that closed the world. The band of the Cylindrical Sea was a wide and menacing barrier, waiting to swallow him up if his fragile wings should fail.

But he had come all this way with no problems and though he was tired he now felt that he had nothing to worry about. He had not even touched his food or water and had been too excited to rest. On the return journey he would relax and take it easy. He was also cheered by the thought that the homeward trip could be twenty kilometers shorter than the outward one, for as long as he cleared the Sea, he could make an emergency landing anywhere. To have to do so would be a nuisance, because he would have a long walk—and, much worse, would have to abandon *Dragonfly.* But the prospect gave him a comforting safety margin.

He was gaining altitude, climbing

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back toward the central spike. Big Horn's tapering needle still stretched for a kilometer ahead of him and sometimes he felt it was the axis on which this whole world turned.

He had almost reached the tip of the giant needle when he became aware of a curious sensation. A feeling of foreboding—and indeed of physical as well as psychological discomfort—had come over him.

At first he shrugged it off and continued his steady pedaling. He had no intention of reporting a vague malaise to Hub. But the discomfort grew steadily worse. Presently he could, quite literally, feel his skin beginning to crawl.

Now seriously alarmed, he stopped to consider his situation. What made it all the more peculiar was the fact that his depressed, heavy feeling was not completely novel—he had known something akin to it before, but could not remember where.

He looked around. Nothing in his environment had changed. The great spike of Big Horn was a few hundred meters above him. Eight kilometers below lay the complicated patchwork of the southern continent, full of wonders that no other man would ever see. In all the utterly alien yet now familiar landscape, he could find no cause for his discomfort.

Something was tickling the back of his hand—for a moment, he thought an insect had landed there and brushed it away without looking. He had only half-completed the swift motion when he realized what he was doing and checked himself, feeling slightly foolish. No one had seen an insect in *Rama*.

He lifted his hand and stared at it, mildly puzzled because the tickling sensation continued. It was then he noticed that every individual hair was erect on his hand and forearm. He touched his head. There, too, his hair stood on end.

So *that* was the trouble—he was in a tremendously powerful electric field and the oppressed, heavy sensation he had felt was similar to that he had sometimes known before a thunderstorm on Earth.

The sudden realization of his predicament brought him close to panic. He had not the faintest idea of where or how lightning might strike on *Rama*—nor did anyone else.

Never before in his life had he felt so helpless in a moment of real physical danger. He had known moments of frustration with balky equipment—as did all spacemen—and there had been times when he had believed himself in a desperately perilous situation. But he had never been helpless. There had always been a way out.

This time no way out existed. He felt naked and alone in a suddenly hostile sky, surrounded by titanic forces that might discharge their furies at any moment. *Dragonfly*—fragile at best—now seemed more insubstantial than the finest gossamer. The first detonation of the gathering energies would blast her to fragments.

He said urgently, "There's a static charge building up around me. I think there's going to be a thunderstorm at any moment—whatever that means here—"

He had not finished speaking when there was a flicker of light behind him. By the time he had counted ten the first crackling rumble arrived. Three kilometers—that put the

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"lightning" back around the Little Horns. He looked toward them and saw that every one of the six needles seemed to be on fire. Brush discharges, hundreds of meters long, were dancing from their points.

What was happening back there could take place on an even larger scale near the tapering spike of Big Horn. His best move would be to get as far as possible from this dangerous structure and to seek clear air. He started to pedal again, accelerating as swiftly as he could without putting too great a strain on *Dragonfly*. At the same time he began to lose altitude—though this would mean entering the region of higher gravity, he was now prepared to take such a risk. Eight kilometers was much too far from the ground for his peace of mind.

The ominous black spike of Big Horn was still free of visible discharges, but he did not doubt that tremendous potentials were building up there. From time to time the thunder still reverberated behind him, rolling around and around the circumference of the world. It suddenly occurred to Jimmy how strange it was to have such a storm in a perfectly clear sky—but, of course, this was not a meteorological phenomenon at all. It might, in fact, be only a comparatively trivial leakage of energy from some hidden source deep in the southern cap of *Rama*. But why now? And, even more important, what next?

He was now well past the tip of Big Horn and hoped that he would soon be beyond the range of any lightning discharges. But now he had another problem—the air was becoming turbulent and he had difficulty in controlling *Dragonfly*. A wind seemed to have sprung up from nowhere and if conditions became much worse the bike's fragile skeleton would be endangered. He pedaled grimly on, trying to smooth out the buffeting by variations in power and movements of his body. Because *Dragonfly* was almost an extension of himself, he was partly successful, but he did not like the faint creaks of protest that came from the main spar, nor the way the wings twisted with every gust.

And now something else worried him—a faint rushing sound, steadily growing in strength, that seemed to come from the direction of Big Horn. It sounded like gas escaping from a valve under great pressure and he wondered if it had anything to do with the turbulence he was battling. Whatever its cause, it added to his disquiet.

From time to time he reported these phenomena to Hub. No one there could give him any advice or even suggest what might be happening but it was reassuring to hear the voices of friends, though the conviction was growing in him that he would never see them again.

The turbulence was still increasing, as if he were entering a jet stream—a thing he had once done in search of a record while flying a high-altitude glider on Earth. But what could possibly create a jet stream inside *Rama*?

He had asked himself the right question—as soon as he had formulated it he knew the answer.

The sound he had heard was the electric wind carrying away the tremendous ionization that must be building up around Big Horn.

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Charged air was spraying out along the axis of *Rama* and more air was flowing into the low-pressure region behind. He looked back at that gigantic and now doubly threatening needle, trying to visualize the boundaries of the gale that was blowing from it. Perhaps his best tactic would be to fly by ear, getting as far as possible away from the ominous hissing.

Rama spared him the necessity of choice. A sheet of flame burst out behind him, filling the sky. He had time to see it split into six ribbons of fire, stretching from the tip of Big Horn to each of the Little Horns. Then the concussion reached him.

JIMMY PAK barely had time to radio: "The wing's buckling—I'm going to crash—" when *Dragonfly* started to fold up gracefully around him. The left wing snapped cleanly in the middle and the outer section drifted away like a gently falling leaf. The right wing put up a more complicated performance. It twisted around at the root, and angled back so sharply that its tip became entangled in the tail. Jimmy felt that he was sitting in a broken kite falling slowly down the sky.

Yet he was not quite helpless. The airscrew still worked and while he had power he still had some measure of control. He had perhaps five minutes to use it.

Was there any hope of his reaching the sea? No—it was much too far away. Then he remembered that he was still thinking in terrestrial terms—though he was a good swimmer, it would be hours before he could possibly be rescued and in that time the poisonous waters would undoubtedly have killed him. His only hope was to come down on land. The problem of the sheer southern cliff he would think about later—if there were any "later."

He was falling slowly through the one-tenth-gravity zone, but would soon start to accelerate. Air-drag, however, would complicate the situation—at least it would prevent his building up too swift a rate of descent. *Dragonfly,* even without power, would act as a crude parachute. And the few kilograms of thrust he could still provide might make all the difference between life and death.

Hub had stopped talking; his friends could see exactly what was happening to him and knew that there was no way conversation could help. Jimmy was doing the most skillful flying of his life—it was too bad, he thought with grim humor, that his audience was so small and could not appreciate the finer details of his performance.

He was going down in a wide spiral. As long as its pitch remained fairly flat his chances of survival were good. His pedaling was helping to keep *Dragonfly* airborne, though he was afraid to exert maximum power. And every time he swung toward south he managed to appreciate the fantastic display *Rama* had kindly arranged for his benefit.

The streamers of lightning still played from the tip of Big Horn down to the lesser peaks beneath, but now the whole pattern was rotating. The six-pronged crown of fire was turning against the spin of *Rama,* making one revolution every few seconds. Jimmy felt that he was watching a giant electric motor in

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operation—and perhaps he was not hopelessly far from the truth.

He was halfway down to the plain, still orbiting in a flat spiral, when the fireworks display suddenly ceased. He could feel the tension drain from the sky and knew without looking that the hairs on his arms were no longer straining upright. Now there was nothing to distract or hinder him during the last few minutes of his fight for life.

As soon as he could be sure of the general area in which he must land he started to study it intently. Much of this region was a checkerboard of totally conflicting environments, as if a mad landscape gardener had been given a free hand and told to exercise his imagination to the utmost. The squares of the checkerboard were almost a kilometer on a side, and though most of them were flat he could not be sure if they were solid, their colors and textures varied so greatly. He decided to wait until the last possible minute before making a decision—if indeed he had any real choice.

When there were a few hundred meters to go he made a last call to the Hub.

"I've still got some control. Will touch down in half a minute—will call you then."

He was being optimistic and everyone knew it. But he refused to say goodbye. Indeed, he felt very little fear and this surprised him, for he had never thought of himself as a particularly brave man. But his environment was so strange and what was happening so unprecedented that he seemed to be watching the struggles of a complete stranger without being himself personally involved. He was studying an interesting problem in aerodynamics, and changing various parameters to see what would happen. Almost the only emotion he felt was a certain remote regret for lost opportunities—of which the most important was the forthcoming Lunar Olympics. One future at least was decided: *Dragonfly* would never show her paces on the moon.

A hundred meters to go. His ground speed seemed acceptable, but how fast was he falling? And here was one piece of luck—the terrain was completely smooth. He would put forth all his strength in a final burst of power, starting now.

The right wing, having done its duty, finally tore off at the roots. *Dragonfly* started to roll over and he tried to correct by throwing the weight of his body against the spin. He was looking directly at the curving arch of landscape sixteen kilometers away when he hit.

It seemed altogether unfair and unreasonable that the sky should be so hard.

XVIII

JIMMY PAK awoke to a splitting headache. He welcomed it—at least it proved that he was still alive.

He tried to move and at once a wide selection of aches and pains brought themselves to his attention. But no part of him seemed to be broken.

Presently he risked opening his eyes, but closed them at once when he found himself staring straight into the band of light along the ceiling of the world. As a cure for a headache, the view lacked something.

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He was still lying there, regaining his strength and wondering how soon he could risk another look, when he heard a crunching noise. He turned his head slowly toward the sound, took a chance and opened his eyes—and almost lost consciousness again.

Not more than five meters away a large crablike creature was apparently dining on the wreckage of poor *Dragonfly*. When Jimmy had recovered his wits he rolled slowly and quietly away from the monster, expecting to be seized by its claws as soon as it discovered that more appetizing fare was available. However, it took not the slightest notice of him. When he had increased their mutual separation to ten meters, he cautiously propped himself up to a sitting position.

From this greater distance the thing did not appear quite so formidable. It had a low, flat body about two meters long and one wide, supported on six triple-jointed legs. Jimmy saw that he had been mistaken in assuming that it was eating *Dragonfly*—in fact, he could see no sign of a mouth. The creature was actually doing a neat job of demolition, using scissor-like claws to chop the skybike into small pieces. A whole row of manipulators, which looked uncannily like tiny human hands, then transferred the fragments to a steadily growing pile on the animal's back.

Or was it an animal? Jimmy Pak began to have second thoughts. There was a purposefulness about the creature's behavior that suggested fairly high intelligence; he could see no reason why any creature acting solely from instinct should carefully collect the scattered pieces of the skybike—unless, perhaps, it was gathering material for a nest.

Keeping a wary eye on the crab, which continued to ignore him, Jimmy struggled to his feet. He discovered that he still had his radio and TV camera. A few wavering steps demonstrated that he could walk, though he was not sure if he could outdistance those six legs. He switched on the radio, never doubting that it would still be operating. A crash that he could survive would not even have been noticed by its solid-state electronics.

"Hub," he said softly. "Can you receive me?"

"Thank God—are you all right?"

"Just a bit shaken. Take a look at this."

He turned his camera toward the crab, just in time to record the final demolition of *Dragonfly's* wing.

"What the devil is it—and why is it chewing up your bike?"

"Wish I knew. It's finished with *Dragonfly*. I'm going to back away—in case it wants to start on me."

Jimmy slowly retreated, never taking his eyes off the crab. It was now moving around in a steadily widening spiral, apparently searching for fragments it might have overlooked, and he was able to get an overall view of it for the first time.

Now that the initial shock had worn off he could appreciate that it was quite a handsome beast. To describe the creature as a "crab" might not be quite accurate—if it had not been so impossibly large he might have called it a beetle. Its carapace had a beautiful metallic sheen.

Interesting—could it be a robot,

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and not an animal? He stared at the creature intently with this thought in mind, analyzing all the details of its anatomy. Where it should have had a mouth was a collection of manipulators that reminded him strongly of multipurpose knives such as were used by some branches of the military. There were pinchers, probes, rasps and even something that looked like a drill. But none of this was decisive. The insect world of Earth had matched all these tools and many more. The animal-or-robot question remained unanswered in his mind.

The eyes, which might have settled the matter, left it even more ambiguous. They were so deeply recessed in protective hoods that it was impossible to tell whether their lenses were made of crystal or jelly. They were quite expressionless and of a startlingly vivid blue. Though they had been directed toward Jimmy several times, they had never shown the slightest flicker of interest. In his perhaps biased opinion, that decided the level of the creature's intelligence. An entity—robot or animal—that could ignore a human being could not be very bright.

IT HAD now stopped its circling and stood still, as if listening to some inaudible message. Then it set off, with a curious rolling gait, in the general direction of the sea. It moved in a perfectly straight line at a steady four or five kilometers an hour and had already traveled a couple of hundred meters before Jimmy's mind registered the fact that the last sad relics of his beloved *Dragonfly* were being carried away from him. He set off in hot and indignant pursuit.

His action was not wholly illogical. The crab was heading toward the sea, and if his own rescue were possible it could only be from this direction. Moreover, he wanted to discover what the creature would do with its trophy—that should reveal something about its motivation and intelligence.

Because he was still bruised and stiff, it took Jimmy several minutes to catch up with the purposefully moving crab. When he had done so he followed it at a respectful distance, until he felt sure that it did not resent his presence. It was then that he noticed his water flask and emergency ration pack among the debris of *Dragonfly*.

He felt instantly both hungry and thirsty. There, scuttling away from him at a remorseless five kilometers an hour, was the only food and drink in all this half of the world. Whatever the risk, he had to get hold of them.

He cautiously closed in on the crab, approaching from right rear. While he kept station with it, he studied the complicated rhythm of its legs until he could anticipate where they would be at any moment. When he was ready he muttered a quick, "Excuse me—" and shot swiftly in to grab his property. He was delighted with his success. He was out again in less than a second and the crab never slackened its steady pace.

He dropped back a dozen meters, moistened his lips from the flask and started to chew a bar of meat concentrate. The small victory made him feel much happier. Now he could even risk thinking about his somber future.

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While there was life, there was hope—yet he could imagine no way he could possibly be rescued. Even if his colleagues crossed the sea, how could he reach them, half a kilometer below?

One of the strangest things about walking inside *Rama* was that you could always see your destination. Here the curve of the world did not hide—it revealed. For some time Jimmy had been aware of the crab's objective. Up there in the land which seemed to rise before him was a wide pit. It was one of three in the southern continent; from the Hub, it had been impossible to see how deep they were. All had been named after prominent lunar craters, and he was approaching Copernicus. The name was hardly appropriate, for there were no surrounding hills and no central peaks. This Copernicus was merely a deep shaft—or well—with perfectly vertical sides.

When he came close enough to look into it, Jimmy was able to see a pool of ominous, leaden-green water at least half a kilometer below. This would put it just about level with the sea and he wondered if they were connected.

Winding down the interior of the well was a spiral ramp, completely recessed into the sheer wall, so that the effect was rather like that of rifling in an immense gun barrel. There seemed to be a remarkable number of turns—not until Jimmy had traced them for several revolutions, becoming more and more confused in the process, did he realize that there was not one ramp but three, totally independent and 120 degrees apart. In any other background than *Rama,* the whole concept would have been an impressive architectural tour de force.

The three ramps led straight down into the pool and disappeared beneath its opaque surface. Near the waterline Jimmy could see a group of black tunnels or caves. They looked rather sinister and he wondered if they were inhabited. Perhaps the Ramans were amphibious.

THE crab approached the edge of the well. Jimmy assumed that it was going to descend one of the ramps—perhaps taking the wreckage of *Dragonfly* to some entity that would be able to evaluate it. Instead, the creature walked straight to the brink, extended almost half its body over the gulf without any sign of hesitation—though an error of a few centimeters could have been disastrous—and gave a brisk shrug. The fragments of *Dragonfly* went fluttering down into the depths. There were tears in Jimmy's eyes as he watched them go. So much, he thought bitterly, for the creature's intelligence.

Having disposed of the garbage, the crab swung around and started toward Jimmy. Was he going to get the same treatment? He hoped the camera was not too unsteady as he showed Hub the rapidly approaching monster. "What do you advise?" he whispered anxiously, without much hope that he would get a useful answer. It was some small consolation to realize that he was making history. His mind raced through the approved patterns for such a meeting. Until now, all of these had been purely theoretical. He would be the first man to check them in practice.

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"Don't run until you're sure it's hostile," Hub whispered to him. Run where? He thought he could outdistance the thing in a hundred-meter sprint, but had a sick certainty that it could wear him down over the long haul.

Slowly Jimmy held up his outstretched, open hands. Men had been arguing for two hundred years about this gesture. Would every creature, everywhere in the universe, interpret this as: *See—no weapons?*

The crab showed no reaction whatsoever, nor did it slacken its pace. Ignoring Jimmy completely, it walked straight past him and headed purposefully southward. Feeling extremely foolish, the acting representative of *Homo sapiens* watched his First Contact stride away across the plain, totally indifferent to his presence.

He had seldom been so humiliated in his life. Then his sense of humor came to his rescue. After all, it was no great matter to have been ignored by an animated garbage truck. It would have been worse if it had greeted him as a long-lost brother.

He walked back to the rim of Copernicus and stared down into its opaque waters. For the first time he noticed that vague shapes—some of them quite large—were moving slowly back and forth beneath the surface. Presently one of them headed toward the nearest spiral ramp and something that looked like a multilegged tank started on the long ascent. At the rate it was going, Jimmy decided, it would take almost an hour to get topside. If it was a threat, it was a very slow-moving one.

Then he noticed a flicker of much more rapid movement near those cavelike openings down by the waterline. Something was traveling swiftly along the ramp, but he could not focus clearly upon it or discern any definite shape. It was as if he were looking at a small whirlwind or dust-devil about the size of a man.

He blinked and shook his head, keeping his eyes closed for several seconds. When he opened them again the apparition was gone.

Perhaps the impact had shaken him up more than he had realized—this was the first time he had ever suffered from visual hallucinations. He would not mention it to Hub.

Nor would he bother to explore those ramps. It would obviously be a waste of energy.

The spinning phantom he had merely imagined—not seen—had nothing to do with his decision. He did not believe in ghosts.

XIX

JIMMY'S exertions had made him thirsty. And in all this land there was no water that a man could drink. With the contents of his flask he could probably survive a week—but for what purpose? The best brains of Earth would soon be focused on his problem and doubtless Commander Norton would be bombarded with suggestions. But Jimmy could imagine no way he could lower himself down the face of that half-kilometer cliff. Even if he had a long enough rope there was no place to attach it.

Nevertheless, it was foolish to give up without a struggle. Any help would have to come from the sea, and while he was marching toward it

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he could carry on with his job as if nothing had happened. No one else would ever observe and photograph the varied terrains through which he must pass and to record them would guarantee a posthumous immortality.

He was only three kilometers from the sea as poor *Dragonfly* would have flown, but it seemed unlikely that he could reach it in a straight line. A week's food and water gave him, however, plenty of time. He would start with the most interesting scenery and send pictures as he walked.

About a kilometer away and a little to his right was a square that glittered like cut glass—or a gigantic display of jewelry. It was probably this thought that triggered Jimmy's footsteps. Even a doomed man might reasonably be expected to take some slight interest in a few thousand square meters of gems.

He was not particularly disappointed when the jewels turned out to be quartz crystals, millions of them, set in a bed of sand. The adjacent square of the checkerboard was actually more interesting, being covered with an apparently random pattern of hollow metal columns, set close together and ranging in height from less than one to more than five meters. The area was completely impassable—only a tank could have crashed through that forest of tubes.

Jimmy walked to the next crossroads. The square on the right was a huge rug or tapestry made of woven wire. He tried to pry loose a strand, but was unable to break it. On the left was a tesselation of hexagonal tiles, so smoothly inlaid that there were no visible joints between them. It would have appeared a continuous surface, had the tiles not been colored all the hues of the rainbow. Jimmy spent futile minutes trying to find two adjacent tiles of the same color, then gave up.

He did a slow pan around the crossroads and asked Hub, "What do you think this is? I feel I'm trapped in a giant puzzle. Or is this the local art gallery?"

"We're as baffled as you, Jimmy. But there's never been any sign that *Rama's* builders went in for art as we know it. Let's wait until we have some more examples before we jump to conclusions."

The two examples he found at the next crossroads were not much help. One area was completely blank—a smooth, neutral gray, hard but slippery to the touch. The other was a soft sponge, perforated with billions upon billions of tiny holes. He tested it with his foot, and the whole surface undulated sickeningly beneath him like barely stabilized quicksand.

At the next crossroads he encountered something strikingly like a ploughed field—except that the furrows were a uniform meter in depth and the material of which they were made had the texture of a file or rasp. But he paid little attention to this, because the square adjacent to it was the most thought-provoking of all that he had seen. At last there was something that he could understand—and it was more than a little disturbing.

THE entire square was surrounded by a fence, so conventional that he would not have looked at it twice had he seen it on Earth. There were posts—apparently of metal—five meters apart, with six strands of wire

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strung taut between them.

Beyond this fence was a second, identical one—and beyond that, a third. It was another typical example of *Rama* redundancy—whatever was penned inside this enclosure would have no chance of breaking out. There was no entrance—no gates could be swung open to drive in the beast; or beasts, that were presumably kept there. Instead, there was a single hole, like a smaller version of Copernicus, in the center of the square.

Even in different circumstances, Jimmy would probably not have hesitated; now he had nothing to lose. He quickly scaled all three fences, walked over to the hole and peered into it.

Unlike Copernicus, this well was only fifty meters deep. There were three tunnel exits at the bottom, each of which looked large enough to accommodate an elephant. And that was all.

After staring for some time, Jimmy decided that the only thing that made sense about the arrangement was for the floor down there to be an elevator. But what it elevated he was never likely to know—he could only guess that it was quite large. And possibly quite dangerous.

During the next few hours he walked more than ten kilometers along the edge of the sea, and the checkerboard squares had begun to blur together in his memory. He had seen some that were totally enclosed in tentlike structures of wire mesh, as if they were giant bird cages. Others seemed to be pools of congealed liquid, full of swirling patterns—however, when he tested them gingerly they were quite solid. And there was one so utterly black that he could not even see it clearly. Only the sense of touch told him that anything was there.

Yet now there was a subtle modulation into something he could understand. Ranging one after the other was a series of—no other word would do—*fields*. He might have been walking past an experimental farm on Earth. Each square was a smooth expanse of carefully leveled dirt, the first he had seen in the metallic landscapes of *Rama*.

The great fields were virgin, lifeless—waiting for crops that had never been planted. Jimmy wondered what their purpose could be, since it was incredible that creatures as advanced as the Ramans would engage in any form of agriculture. Even on Earth farming was no more than a popular hobby and a source of exotic luxury foods. But he could swear that these were potential farms, immaculately prepared. He had never seen dirt that looked so clean. Each square was covered with a great sheet of tough, transparent plastic. He tried to cut through it to obtain a sample, but his knife would barely scratch the surface.

Further inland were other fields and on many of them were complicated constructions of rods and wires, presumably intended for the support of climbing plants. They looked bleak and desolate, like leafless trees in the depths of winter. The winter they had known must have been long and terrible indeed and these few weeks of light and warmth might be only a brief interlude before it came again.

Jimmy never knew what made him stop and look more closely into a

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metal maze to the south. Unconsciously his mind must have been checking every detail around him. It had noticed, in this fantastically alien landscape, something even more anomalous.

About a quarter of a kilometer away, in the middle of a trellis of wires and rods, glowed a single speck of color. It was so small and inconspicuous that it was almost at the limit of visibility—on Earth no one would have looked at it twice. Yet undoubtedly one of the reasons he had noticed it now was because it reminded him of Earth.

He did not report to Hub until he was sure that he had made no mistake and that wishful thinking had not deluded him. Not until he was only a few meters away could he be completely sure that life as he knew it had intruded into the sterile, aseptic world of *Rama.* For blooming here in lonely splendor at the edge of the southern continent was a flower.

As he came closer it became obvious to Jimmy that something had gone wrong. There was a hole in the sheathing that, presumably, protected this layer of dirt from contamination by unwanted life forms. Through this break extended a green stem about as thick as a man's little finger, which twined its way up through the trellis. A meter from the ground it burst into an efflorescence of bluish leaves, shaped more like feathers than the foliage of any plant known to Jimmy. The stem ended, at eye-level, in what he had first taken to be a single flower. Now he saw, with no surprise at all, that it was actually three flowers tightly packed together.

The petals were brightly colored tubes about five centimeters long. There were at least fifty in each bloom and they glittered with such metallic blues, violets and greens that they seemed more like the wings of a butterfly than anything in the vegetable kingdom. Jimmy knew practically nothing about botany, but he was puzzled to see no trace of any structures resembling pistils or stamens.

He wondered if the likeness to terrestrial flowers might be a pure coincidence. Perhaps this was something more akin to a coral polyp.

It did not really matter. Whatever the scientific definition, to Jimmy this was a flower. The strange miracle, the un-*Rama*-like accident, of its existence reminded him of all that he would never see again—and he was determined to possess it.

That would not be easy. It was more than ten meters away, separated from him by a lattice-work made of thin rods. They formed a cubic pattern, repeated over and over again, less than thirty centimeters on a side. Jimmy would not have been flying skybikes unless he had been slim and wiry, so he knew he could crawl through the interstices of the grid. But getting out again might be quite a different matter—it would certainly be impossible for him to turn around, so he would have to retreat backward.

Hub was delighted with his discovery when he had described the flower and scanned it from every available angle.

There was no objection when he said, "I'm going after it." Nor did he expect there to be; his life was now his own, to do with as he pleased.

He stripped, grasped the smooth

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metal rods and started to wriggle into the framework. It was a tight fit. He had to fight feeling like a prisoner who was escaping through the bars of his cell. When he had inserted himself completely into the lattice he tried backing out again just to see if there were any problems. It was considerably more difficult, since he now had to use his outstretched arms for pushing instead of pulling, but he saw no reason why he should become helplessly trapped.

Jimmy was a man of action and impulse, not of introspection. As he squirmed uncomfortably along the narrow corridor of rods he wasted no time asking himself just why he was performing so quixotic a feat. He had never been interested in flowers in his whole life, yet now he was gambling his last energies to collect one.

It was true that this specimen was unique and of enormous scientific interest. But he really wanted it because it was his last link with the world of life and the planet of his birth.

Yet when the flower was within his grasp, he had sudden qualms. Perhaps it was the only flower that grew in the whole of *Rama.* Was he justified in collecting it?

If he needed any excuse he could console himself with the thought that the Ramans themselves had not included it in their plans. It was obviously a freak, growing ages too late—or too soon. But he did not really want an excuse, and his hesitation was only momentary. He reached out, grasped the stem and gave a sharp jerk.

The flower came away easily enough. He also collected two of the leaves, then started to back slowly through the lattice. He had only one free hand now and progress was extremely difficult, even painful. He soon had to pause to regain his breath. It was then that he noticed that the feathery leaves were closing and the headless stem was slowly unwinding itself from its supports. As he watched with a mixture of fascination and dismay, he saw that the whole plant was steadily retreating into the ground as if mortally injured.

I've murdered something beautiful, Jimmy told himself. But then *Rama* had killed him. He was only collecting what was his rightful due.

XX

COMMANDER NORTON had never yet lost a man and he had no intention of starting now. He had been considering ways of rescuing Jimmy in the event of accident even before that accident had occurred. The problem, however, had turned out to be so difficult that he had found no answer. All that he had managed to do had been to eliminate every obvious solution.

How does one climb a half-kilometer vertical cliff—even in reduced gravity? With the right equipment and training the feat would be easy enough. But there were no piton-guns aboard *Endeavor* and no one could think of any other practical way of driving the necessary hundreds of spikes into that hard mirror surface.

He had glanced briefly at more exotic solutions, some frankly crazy. Perhaps a simp, fitted with suction pads, could make the ascent. But

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even if this scheme were practical, how long would it take to manufacture and test such equipment and to train a simp to use it?

Then there was more advanced technology. The EVA propulsion units were tempting, but their thrust was too weak—they were designed for operation in zero gravity. They could not possibly lift the weight of a man against *Rama's* pull.

Could an EVA thruster be sent up on automatic control, carrying only a rescue line? He had tried out this idea on Sergeant Myron, who had promptly shot it down in flames. There were, the engineer pointed out, severe stability problems. These might be solved, but it would take a long time—much longer than *Endeavor's* crew could afford.

What about balloons? There seemed a faint possibility here—if they could devise an envelope and a sufficiently compact source of heat. This was the only approach that Norton had not dismissed, when the problem suddenly ceased to be one of theory and became a matter of life and death, dominating the news in all the inhabited worlds.

While Jimmy was making his trek along the edge of the sea, half the crackpots in the solar system were trying to save him. At Fleet Headquarters, all the suggestions were considered and about one in a thousand was forwarded to *Endeavor.* Dr. Carlisle Perera's arrived twice—once via the Survey's own network, and once by way of Planetcom, Rama Priority. It had taken the scientist approximately five minutes of thought and one millisecond of computer time.

At first Commander Norton thought Perera's idea was a joke in poor taste. Then he saw the sender's name and the attached calculations—and did a quick double-take.

He handed the message to Karl Mercer.

"What do you think of this?" he asked, in as noncommittal a tone of voice as he could manage.

Karl read it swiftly, then said, "Well, I'm damned! He's right, of course."

"Are you sure?"

"He was right about the storm, wasn't he? We should have thought of this—that we didn't makes me feel a fool."

"You have company. The next problem is—how do we break it to Jimmy?"

"I don't think we should—until the last possible minute. That's how I'd prefer it in his shoes. Just tell him we're on the way."

THOUGH he could look across the full width of the Cylindrical Sea and knew the general direction from which *Resolution* was coming, Jimmy did not spot the tiny craft until it had passed New York. It seemed incredible that it could carry six men and whatever equipment they had brought to rescue him.

When it was only a kilometer away he recognized Commander Norton and started waving. A little later the skipper spotted him and waved back.

"Glad to see you're in good shape, Jimmy," he radioed. "I promised we wouldn't leave you behind. Now do you believe me?"

"I'll believe you, skipper," Jimmy said, "when I'm down there on the deck. Now will you tell me how I'm going to make it?"

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Resolution was slowing down a hundred meters from the base of the cliff. As far as Jimmy could tell she carried no unusual equipment.

"Sorry about the secrecy, Jimmy. We didn't want you to have too many things to worry about."

Resolution came to a halt fifty meters out and five hundred meters below. Jimmy had almost a bird's-eye view of the commander as he spoke into his microphone.

"This is it, Jimmy. You'll be perfectly safe, but it will require nerve. We know you've got plenty of that. *You're going to jump.*"

"Five hundred meters!"

"Yes, but at only half a gee."

"So—have you ever fallen two hundred and fifty on Earth?"

"Shut up, or I'll cancel your next leave. You should have worked this out for yourself. It's a question of terminal velocity. In this atmosphere you can't reach more than ninety kilometers an hour—whether you fall two hundred or two thousand meters. Ninety's a little high for comfort, but we can trim it some more. This is what you'll have to do, so listen carefully."

"I will," said Jimmy. "It had better be good."

He did not interrupt the commander again and made no comment when Norton had finished. Yes, the plan made sense and was so absurdly simple that only a genius would have thought of it. Or, perhaps, someone who did not expect to do it himself.

Jimmy had never tried high-diving, or made a delayed parachute drop, both of which would have given him some psychological preparation for this feat. One could tell a man that it was perfectly safe to walk a plank across an abyss, but he might still be unable to do it. Now Jimmy understood why Norton had been so evasive about the details of the rescue. He had been given no time to brood or think of objections.

"I don't want to hurry you," said Norton's persuasive voice from half a kilometer below. "But the sooner the better."

Jimmy looked at his precious souvenir, the only flower in *Rama.* He wrapped it very carefully in his grimy handkerchief, knotted the fabric and tossed it over the edge of the cliff.

It fluttered down with reassuring slowness, but it also took a very long time, getting smaller and smaller and smaller, until he could no longer see it. But then *Resolution* surged forward and he knew that it had been spotted.

"Beautiful!" exclaimed the commander enthusiastically. "I'm sure they'll name it after you. Okay, we're waiting."

Jimmy stripped off his shirt—the only upper garment anyone ever wore in this now tropical climate—and stretched it thoughtfully. Several times on his trek he had almost discarded it. Now it might help to save his life.

For the last time he looked back at the hollow world he alone had explored, and the distant, ominous pinnacles of the Big and Little Horns. Then, grasping the shirt firmly with his right hand, he took a running jump as far out over the cliff as he could.

Now there was no particular hurry—he had a full twenty seconds in which to enjoy the experience. But he did not waste any time as the wind strengthened around him and

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Resolution slowly expanded in his field of view. Holding his shirt with both hands, he stretched his arms above his head, so that the rushing air filled the garment and blew it into a hollow tube.

As a parachute it was hardly a success. The few kilometers an hour it subtracted from his speed was useful, but not vital. It was doing a much more important job—keeping his body vertical, so that he would arrow straight into the sea.

He still had the impression that he was not moving at all, but that the water below was rushing up toward him. Once he had committed himself he had no sense of fear—indeed, he felt a certain indignation against the skipper for having kept him in the dark.

At the very last moment he let go of his shirt, took a deep breath and grabbed his mouth and nose with his hands. As he had been instructed, he stiffened his body into a rigid bar and locked his feet together. He would enter the water as cleanly as a falling spear.

"It will be just the same," the commander had promised, "as stepping off a diving board on Earth. Nothing to it—if you make a good entry."

"And if I don't?'

"Then you'll have to go back and try again."

SOMETHING slapped him across the feet—hard, but not viciously. A million slimy hands were tearing at his body. There was a roaring in his ears, a mounting pressure—and even though his eyes were tightly closed, he could tell that darkness was falling as he arrowed into the depths of the Cylindrical Sea.

With all his strength, he started to swim up toward the fading light. He could not open his eyes for more than a single blink—the poisonous water felt like acid when he did so. He seemed to have been struggling for ages, and more than once he had a nightmare fear that he had lost his orientation and was really swimming downward. Then he would risk another quick glimpse, and every time the light was stronger.

His eyes were still clenched tightly shut when he broke water. He gulped a precious mouthful of air, rolled over on his back and looked around. *Resolution* was heading toward him at top speed; within seconds, eager hands had grabbed him and dragged him aboard.

"Did you swallow any water?" was the commander's first question.

"I don't think so."

"Rinse out with this, anyway. That's fine. How do you feel?"

"I'm not really sure. I'll let you know in a minute. Oh—thanks, everybody." The minute was barely up when Jimmy was only too sure how he felt.

"I'm going to be sick," he confessed miserably.

"In a dead calm—on a flat sea?" protested Sergeant Barnes, who seemed to regard Jimmy's plight as a direct reflection on her skill.

"I'd hardly call it flat," said the commander, waving his arm around the band of water that circled the sky. "But don't be ashamed—you may have swallowed some of that stuff. Get rid of it as quickly as you can."

Jimmy was still straining, unheroi-

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cally and unsuccessfully, when there was a sudden flicker of light in the sky behind them. All eyes turned towards the South Pole and Jimmy instantly forgot his sickness. The Horns had started their fireworks display again.

There were the kilometer-long streamers of fire, dancing from the central spike to its smaller companions. Once again they began their stately rotation, as if invisible dancers were winding their ribbons around an electric maypole. But now they began to accelerate, moving faster and faster until they blurred into a flickering cone of light.

It was a spectacle more awe-inspiring than any they had yet seen—and it brought with it a distant crackling roar that added to the impression of overwhelming power. The display lasted for about five minutes. Then it stopped as abruptly as if someone had turned a switch.

"I'd like to know what the *Rama* Committee make of that," Norton muttered to no one in particular. "Has anyone here any theories?'

There was no time for an answer, because at that moment Hub called in great excitement.

"Resolution! Are you okay? Did you feel that?"

"Feel what?"

"We think it was an earthquake. It must have happened the minute these fireworks stopped."

"Any damage?"

"I don't think so. It wasn't really violent, but it shook us up a bit."

"We felt nothing at all. But we wouldn't, out here in the sea."

"Of course, silly of me. Anyway, everything seems quiet now—until next time."

"Yes, until the next time," Norton echoed. The mystery of *Rama* was steadily growing—the more he learned about it, the less he understood.

A sudden shout came from the helm.

"Skipper—look—up there in the sky!'

Norton lifted his eyes, swiftly scanning the circuit of the sea. He saw nothing, until his gaze had almost reached the zenith and he was staring at the other side of the world.

"My God," he whispered slowly, as he realized that the "next time" was already almost here.

A tidal wave was racing toward them, down the eternal curve of the Cylindrical Sea.

XXI

IN THAT moment of shock Norton's first concern was for his ship.

"Endeavor!" he called. "Situation report, please."

"All okay, skipper," was the reassuring answer. "We felt a slight tremor, but nothing that could cause any damage. There's been a small change of attitude—the bridge says about point two degrees. They also think the spin rate has altered slightly—we'll have an accurate reading on that in a couple of minutes."

So it's beginning to happen, Norton told himself, *and a lot earlier than we expected.* They were a long way from perihelion and the logical time for an orbit change. But some kind of trim was undoubtedly taking place—and there might be more shocks to come.

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The effects of this first one, meanwhile, were all too obvious up there on the curving sheet of water. The wave was still about ten kilometers away and stretched the full width of the sea from northern to southern shore. Near the land it was a foaming wall of white, but in deeper water it was a barely visible blue line, moving much faster than the breakers on either flank. The drag of the shoreward shallows was already bending it into a bow, with the central portion getting farther and farther ahead.

"Sergeant Barnes," Norton said urgently. "This is your job. How do we proceed?"

Sergeant Barnes had brought the raft completely to rest and was studying the situation intently. Her expression, Norton was relieved to see, showed no trace of alarm—rather a certain zestful excitement. She looked like a skilled athlete about to accept a challenge.

"I wish we had some soundings," she said. "If we're in deep water there's nothing to worry about."

"Then we're all right. We're still four kilometers from shore."

"I hope we have enough water under us, but I want to study the situation."

She applied power again and swung *Resolution* around until it was just under way, heading directly toward the approaching wave. Norton judged that the swiftly moving central portion would reach *Resolution* in less than five minutes, but he could also see that it presented no serious danger. It was only a racing ripple a fraction of a meter high and would scarcely rock the boat. The walls of foam lagging far behind it were the real menace.

Suddenly, in the very center of the sea, a line of breakers appeared. The wave had clearly hit a submerged wall several kilometers in length, not far below the surface. At the same time the breakers on the two flanks collapsed as they ran into deeper water.

Anti-slosh plates, Norton told himself. Probably similar to those in *Endeavor's* propellant tanks—but built on a thousandfold greater scale. There must be a complex pattern of them all around the sea, to damp out any waves as quickly as possible.

The only thing that matters now is—are we right on top of one?

Sergeant Barnes was one jump ahead of him. She had again brought *Resolution* to a full stop and now threw out the anchor. It hit bottom at only five meters.

"Haul it up," she called to her crewmates. "We've got to get away from here!"

Norton agreed—but in which direction? Next he realized that the sergeant was headed at full speed toward the wave, now only five kilometers away. For the first time he could hear the sound of its approach—a distant, unmistakable roar he had never expected to hear inside *Rama.* Then it changed in intensity—the central wave's central portion was collapsing once more and the flanks were building breakers again.

He tried to estimate the distance between the submerged baffles, assuming that they were spaced at equal intervals, and concluded that there should be one more before the wave and *Resolution* met. The idea would be to station the raft in the deep water between the baffles . . .

Sergeant Barnes cut speed and

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threw out the anchor again. It went down thirty meters without hitting bottom.

"We're okay," she said with a sight of relief. "But I'll keep the motor running."

NOW there were only the lagging walls of foam along the coast—out here the sea was calm again, apart from the inconspicuous blue ripple still speeding toward them. The sergeant was barely holding *Resolution* on course toward the disturbance, ready to pour on full power at a moment's notice.

Then, a scant two kilometers ahead, the sea started to foam once more. It humped up in white-maned fury and now its roaring seemed to fill the world. Upon the sixteen-kilometer-high wave of the Cylindrical Sea was superimposed a thundering avalanche.

Sergeant Barnes shouted above the roar, "I've ridden bigger ones than this—but if we have to jump wait until I tell you—"

She was magnificent, Norton thought. She was obviously enjoying every minute, like a Viking warrior going into battle.

The wave continued to rise, curving upward and over. It looked enormous—an irresistible force of nature that would overwhelm everything in its path. Then it collapsed as if its foundations had been pulled out from under it. It was over the submerged barrier and had fallen into deep water again. When it reached her a moment later the *Resolution* merely bounced up and down a few times before Sergeant Barnes swung the raft around and set off at top speed toward the north shore.

"Thanks, Ruby—that was splendid. But will we get home before it comes around for the second time?"

"Probably not. It will be back in about twenty minutes. But it will have lost strength by then. We should scarcely notice it."

Norton relaxed, though he knew he would not be completely at ease until they were back on land. The disturbance had left the water swirling in random eddies and had stirred up a peculiar acidic smell—"Like crushed ants," somebody said. But though unpleasant, the odor caused no seasickness or other discomfort. It was something so alien that human physiology could not respond to it.

A minute later the wave front hit the next underwater barrier. Seen from the rear, the spectacle was unimpressive and Norton felt ashamed of his earlier reaction. He began to feel that Sergeant Barnes and her crew were masters of the Cylindrical Sea.

His shock was therefore all the greater when, not more than a hundred meters away, something like a slowly rotating wheel began to rear up out of the water. Glittering metallic spokes, five meters long, emerged dripping from the sea, spun for a moment in the fierce glare of *Rama* and splashed back into the water. It was as if a giant starfish with tubular arms had broken the surface.

At first sight, it was impossible to tell whether the thing was an animal or a machine. Then it flopped over and lay partly awash, bobbing up and down in the gentle aftermath of the wave.

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Norton counted nine arms, apparently jointed, radiating from a central disc. Two were broken, snapped off at the outer joint. The others ended in complicated collections of manipulators that reminded Norton of the crab Jimmy Pak had encountered. Jimmy confirmed that the two creatures came from the same line of evolution—or the same drawing-board.

At the middle of the disk was a small turret, bearing three large eyes. Two were closed. One was open, but seemed blank and unseeing. Norton decided he and the crew were watching the death throes of some strange monster, tossed up to the surface by the submarine disturbance that had just passed.

Next he realized the monster was no longer alone. Swimming around it, snapping at its still feebly moving limbs, were two small beasts like overgrown lobsters. They were efficiently chopping up the monster and it did nothing to resist, though its own claws seemed quite capable of dealing with the attackers.

Jimmy Pak was again reminded of the crab that had demolished *Dragonfly*. He watched intently as the one-sided conflict continued and quickly confirmed an earlier impression.

"Look, skipper," he whispered. "They're not eating it. They don't even have any mouths. They're simply chopping it to pieces. That's exactly what happened to *Dragonfly*—"

"You're right. They're dismantling it as if it were a broken machine." Norton wrinkled his nose. "But no dead machine ever smelled like that." Then another thought struck him. "My God—suppose they start on us! Ruby, get this contraption to shore as quickly as you can."

Resolution surged forward with reckless disregard for the life of her power cells. Norton stared back. The nine spokes of the great starfish—he could think of no better name for it—were clipped steadily shorter, and presently the weird tableau sank back into the depths of the sea.

There was no pursuit, but he did not breathe comfortably again until *Resolution* had drawn up to the landing stage and the crew had stepped ashore. As he looked back across that mysterious and now suddenly sinister band of water, Commander Norton grimly determined that no one would ever sail it again. There were too many unknowns, too many dangers.

He also looked back at the towers and ramparts of New York and the dark cliff of the continent beyond. They were safe now from inquisitive man.

He would not tempt the gods of *Rama* again.

XXII

FROM now on, Norton had decreed, there would at all times be at least three people at Camp Alpha—and one would be awake at any given moment. All other exploring parties would follow the same pattern. Potentially dangerous creatures were on the move inside *Rama* and, though none had shown active hostility, a prudent commander would take no chances.

As an extra safeguard an observer up on the Hub kept constant watch

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through a powerful telescope. The whole interior of *Rama* could be surveyed from this vantage point—even the South Pole appeared only a few hundred meters away. The territory around any group of explorers was to be kept under regular observation. That way Norton hoped to eliminate any possibility of surprise. It was a good plan—and it failed completely.

After the last meal of the day and just before the 22:00 hour sleep period, Norton, Rodrigo, Calvert and Laura Ernst were watching the regular evening news telecast specially beamed to Camp Alpha from the transmitter at Inferno, Mercury. They had been particularly interested in seeing Jimmy's tape of the southern continent and the rescue team's return across the Cylindrical Sea—both episodes had aroused much comment. Scientists, news commentators and members of the *Rama* Committee had given their opinions, most of them contradictory. No one could agree whether the crablike creature Jimmy had encountered was an animal, a machine, a genuine Raman—or something that fitted none of these categories.

The Camp Alpha team had just finished watching—with distinctly queasy feelings—the giant starfish being demolished by predators when an intruder was discovered in the camp.

Laura Ernst noticed it first. She froze in sudden shock, then said, "Don't move fast, Bill. But look slowly to the right."

Norton turned his head. Ten meters away was a slender-legged tripod surmounted by a spherical body no larger than a football. Set around the body were three large, expressionless eyes, apparently giving 360 degrees of vision, and trailing beneath it were three whiplike tendrils. The creature was not quite as tall as a man and looked far too fragile to be dangerous, but that did not excuse the camp watch's letting it sneak in unnoticed. The creature suggested to Norton a three-legged spider or daddy longlegs and he wondered how it had solved the problem—never even challenged by any creature on Earth—of tripedal locomotion.

"What do you make of it, Laura?" he whispered, turning off the voice of the TV newscaster.

"Usual *Rama* three-fold symmetry. I don't see how it could hurt us, though those whips might be unpleasant—and they could be poisonous, like a coelenterate's. Sit tight and see what it does.'

After regarding them impassively for several minutes the creature suddenly moved—and now they could understand why they had failed to observe its arrival. It was fast. It covered the ground with such an extraordinary spinning motion that the human eye and mind had real difficulty in following it.

As far as Norton could judge—and only a high-speed camera could settle the matter—each leg in turn acted as a pivot around which the creature whirled its body. And he was not sure, but it also seemed to him that every few "steps" it reversed its tion of spin, while the three whips flickered over the ground like lightning as it moved. Its top speed—though this also was very hard to estimate—was at least thirty kilometers an hour.

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IT SWEPT swiftly around the camp, examining every item of equipment, delicately touching the improvised beds, chairs, tables, communication gear, food containers, electrosans, cameras, water tanks, tools—it seemed to ignore nothing except the human watchers. Clearly it was intelligent enough to draw a distinction between living organisms and their inanimate property—its actions gave the unmistakable impression of an extremely methodical curiosity or inquisitiveness.

"I wish I could examine it—" Laura's whisper expressed frustration as the creature continued its swift, pirouette. "Should we try to catch it?"

"How?" Calvert asked, reasonably enough.

"You know—the way primitive hunters brought down fast-moving animals with a couple of weights whirling around at the end of a rope—a bola. It doesn't even hurt."

"That I doubt," said Norton. "But even if it worked, we can't risk it. We don't know how intelligent or physically strong this creature is—a trick like that could easily break its legs. Then we would be in real trouble—from *Rama,* Earth and everyone else."

"But I've got to have a specimen."

"You may have to be content with Jimmy's flower unless one of these creatures cooperates with you. Force is out. How would you like it if something landed on Earth and decided that you would make a nice specimen for dissection?"

"I don't want to dissect it," said Laura, not at all convincingly. "I only want to examine it."

"Well, alien visitors might have the same attitude toward you, but you could have a very uncomfortable time before you believed them. We must make no move that could possibly be regarded as threatening."

He was quoting from ship's orders, of course, and Laura knew it. The claims of science had a lower priority than those of space diplomacy.

But there was no need to bring in such elevated considerations here—the behavior of humans in *Rama* was merely a matter of good manners. They were all visitors here and had never even asked permission to come in.

The creature seemed to have finished its inspection. It made one more high-speed circuit of the camp, then shot off at a tangent—toward the stairway.

"I wonder how it's going to manage the steps?" Laura mused. Her question was quickly answered; the spider ignored the steps completely and headed up the gently sloping curve of the ramp without slackening its speed.

Norton radioed Hub. "You may have a visitor shortly; take a look at the Alpha Stairway Section Six. And incidentally, thanks a lot for keeping such a good watch on us."

It took a minute for the sarcasm to sink in; then the Hub observer started to make apologetic noises, finished with: "I can just see something, skipper, now that you tell me it's there. But what is it?"

"Your guess is as good as mine," Norton answered as he pressed the General Alert button. "Camp Alpha calling all stations. We've just been visited by a creature like a three-legged spider. Extremely thin legs, about two meters high, small

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spherical body—travels very fast with a spinning motion. Appears harmless but inquisitive. It may sneak up on you before you notice it. Please acknowledge."

The first reply came from London, fifteen kilometers to the East.

"Nothing unusual here, skipper."

The same distance to the West, Rome answered, sounding suspiciously sleepy.

"Same here, skipper. Uh, just a moment—"

"What is it?"

"I put my pen down a minute ago and it's gone. What—oh!"

"Talk sense."

"You won't believe this, skipper. I was making some notes—you know I like writing and it doesn't disturb anybody. I was using my favorite ballpoint, the one that's nearly two hundred years old. Well, now it's lying on the ground, about five meters away. I've got it—and damned glad it isn't damaged."

"And how do you suppose it got there?"

"Ah—I may have dozed off for a minute. It's been a hard day."

Norton sighed, but refrained from comment. He had so few people and they had so little time in which to explore a world. Enthusiasm could not always overcome exhaustion and he wondered if they were taking unnecessary risks. Perhaps he should not split his men up into such small groups and try to cover so much territory. But he was always conscious of the swiftly passing days and the unsolved mysteries around him. He was becoming more and more certain that something was about to happen and that they would have to abandon *Rama* even before it reached perihelion—the moment of truth when any orbit change must surely take place.

"Now listen, Hub, Rome, London—everyone," he said. "I want a report every half-hour through the night. We must assume that from now on we may expect visitors at any time. Some may be dangerous, but at all costs we have to avoid—incidents. You all know the directives on this subject."

That was true enough—the directives were part of their training. Yet perhaps none of them had ever really believed that the long-theorized "physical contact with intelligent aliens" would occur in their lifetimes—still less that they would experience it themselves.

Training was one thing, reality another, and no one could be sure that the ancient human instincts of self-preservation would not take over in an emergency. Yet it was essential to give every entity they encountered in *Rama* the benefit of the doubt, up to the last possible minute—and even beyond.

Commander Norton did not want to be remembered by history as the man who started the first interplanetary war.

WITHIN a few hours there were hundreds of the spiders and they were all over the plain. Through the telescope it could be seen that the southern continent was also infested with them—but not, it seemed, the island of New York.

They took no further notice of the explorers, and after a while the explorers took little notice of them—though from time to time Norton still detected a predatory gleam in

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Laura Ernst's eye. Nothing would please her better, he was sure, than for one of the spiders to have an unfortunate accident—and he would not put it past her to arrange one in the interest of science.

It seemed virtually certain that the spiders could not be intelligent; their bodies were far too small to contain much in the way of brains—and indeed it was hard to see where they stored all the energy to move. Yet their behavior was curiously purposeful and coordinated; they seemed to be everywhere, but they never visited the same place twice. Norton frequently had the impression that they were *searching* for something. Whatever it was, they did not seem to have discovered it.

They went all the way up to the central Hub, still scorning the three great stairways. How they managed to ascend the vertical sections, even under almost zero gravity, was not clear; Laura theorized that they were equipped with suction pads.

And then, to her obvious delight, she got her eagerly desired specimen. Hub reported that a spider had fallen down the vertical face and was lying, dead or incapacitated on the first platform. Laura's time up from the plain was a record that would never be beaten.

When she arrived at the platform she found that, despite the low velocity of impact, the creature had broken all its legs. Its eyes were still open, but it showed no reactions to any external tests. Even a fresh human corpse would have been livelier, Laura decided. As soon as she got her prize back to *Endeavor* she started to work with her dissecting kit.

The spider was so fragile that it almost came to pieces without her assistance. She disarticulated the legs, then started on the delicate carapace, which split along three great circles and opened up like a peeled orange.

After some moments of blank incredulity—for she found nothing she could recognize or identify—she took a series of careful photographs. Then she picked up her scalpel.

Where to start cutting? She felt like closing her eyes and stabbing at random, but that would not have been very scientific.

The blade went in with practically no resistance. A second later, Surgeon-Commander Ernst's most unladylike yell echoed the length and breadth of *Endeavor.*

It took an annoyed Sergeant McAndrews a good twenty minutes to calm down the startled simps.

XXIII

"AS YOU are all aware, gentlemen," said the Martian ambassador, "a great deal has happened since our last meeting. We have much to discuss—and to decide. I'm therefore particularly sorry that our distinguished colleague from Mercury is not here."

That last statement was not altogether accurate. Dr. Bose was not particularly sorry. It would have been much more truthful to say that he was worried. All his diplomatic instincts told him that something was happening and though his sources of information were excellent, he could gather no hints as to what it might be.

The ambassador's letter of apology had been courteous and entirely un-

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communicative. His Excellency had regretted that urgent and unavoidable business had kept him from attending the meeting either in person or by video. Dr. Bose found it very hard to think of anything more urgent—or more important—than *Rama*.

"Two of our members have statements to make. I would first like to call on Professor Davidson."

There was a rustle of excitement among the other scientists on the committee. Most of them had felt that the astronomer, with his well-known cosmic viewpoint, was not the right man to be chairman of the Space Advisory Council. He sometimes gave the impression that the activities of intelligent life were an unfortunate irrelevance in the majestic universe of stars and galaxies and that it was bad manners to pay too much attention to it. This had not endeared him to exobiologists such as Dr. Perera, who took exactly the opposite view. To them the only purpose of the universe was the production of intelligence and they were apt to talk sneeringly about purely astronomical phenomena. *Mere dead matter*... was one of their favorite phrases.

"Mr. Ambassador," Professor Davidson began, "I have been analyzing the curious behavior of *Rama* during the last few days and would like to present my conclusions. Some of them are rather startling."

Dr. Perera looked surprised, then smug. He strongly approved of anything that startled Professor Davidson.

"First of all, there was the remarkable series of events when that young lieutenant flew to the southern end of *Rama*. The electrical discharges themselves, though spectacular, are not important. It is easy to show that they contained relatively little energy. But they coincided with a change in *Rama's* rate of spin and its attitude—that is, its orientation in space. *This* must have involved an enormous amount of energy—the discharges that nearly cost Lieutenant—er—Pak his life were merely a minor byproduct—perhaps a nuisance that had to be minimized by those giant lightning conductors at the south pole.

"I draw two conclusions from this. When a spacecraft—and we must call *Rama* a spacecraft despite its fantastic size—makes a change of attitude it usually means it is about to make a change of orbit. We must therefore take seriously the views of those who believe that *Rama* may be preparing to become another planet of our sun, instead of going back to the stars.

"If this should prove to be the case *Endeavor* must obviously be prepared to cast off—is that what spaceships do?—at a moment's notice. She may be in serious danger while she is still physically attached to *Rama*. I imagine that Commander Norton is already well aware of this possibility, but I think we should send him an additional warning."

"Thank you very much, Professor Davidson. Yes—Dr. Solomons?"

"I'd like to comment on that" said Dr. Solomons. "*Rama* seems to have made a change of spin without using any jets or reaction devices. This leaves only two possibilities, it seems to me. The first one is that it has internal gyroscopes or their equivalent. They must be enormous—where are they? The second possibility,

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which would turn all our physics upside down, is that it has a reactionless propulsion system. The so-called spacedrive, which Professor Davidson doesn't believe in. If this is the case *Rama* may be able to do almost anything. We will be quite unable to anticipate its behavior even on the gross physical level."

The diplomats were—obviously baffled by this exchange and Davidson refused to be drawn in deeper. He had gone out on enough limbs for one day.

"I'll stick to the laws of physics, if you don't mind, until I'm forced to give them up. That we've not found any gyroscopes in *Rama* may mean that we have not looked hard enough—or in the right place."

Ambassador Bose could see that Dr. Perera was growing impatient. Normally the exobiologist was as happy as anyone else to engage in speculation, but now he had some solid facts for the first time. His long-impoverished science had become wealthy overnight.

"Very well. If there are no other comments, I know that Dr. Perera has some important information."

"Thank you, Mr. Ambassador. As you've all seen we have at last obtained a specimen of one life form on *Rama* and have observed several others at close quarters. Surgeon-Commander Ernst, *Endeavor's* medical officer, has sent a full report on the spiderlike creature she dissected. I must say at once that some of her results are baffling, and in any other circumstances I would have refused to believe them.

"The spider is definitely organic, though its chemistry differs from ours in many respects—it contains considerable quantities of light metals. Yet I hestitate to call it an animal, for several fundamental reasons.

"In the first place, it seems to have no mouth, no stomach, no gut—no method of ingesting food. It also has no air intakes, no lungs, no blood and no reproductive system.

"You may wonder what it does have. Well, a simple musculature controls its three legs and the three whiplike tendrils or feelers. There's a brain—fairly complex, mostly concerned with the creature's remarkably developed tri-ocular vision. But eighty per cent of the body consists of a honeycomb of large cells. This is what gave Dr. Ernst such an unpleasant surprise when she started her dissection. If she had been luckier she might have recognized it in time, because the honeycomb is the one structure we've found on *Rama* that does exist on Earth—though only in a handful of marine animals.

"Most of the spider is simply a battery, very much like that found in electric eels and rays. But in this case it's apparently not used for defense—it's the creature's source of energy. That is why the beast has no provisions for eating and breathing. It doesn't need such primitive arrangements. And incidentally, this means that it would be perfectly at home in a vacuum.

"So we have a creature which, to all intents and purposes, is nothing more than a mobile eye. It has no organs of manipulation—those tendrils are much too feeble. If I had been given its specifications, I would have said it's merely a reconnaissance device."

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"Its behavior certainly fits that description. But the other creatures are different. The crabs, the starfish, the sharks—for want of better designations—can obviously manipulate their environment and appear to be specialized for various functions. I assume that they are also electrically powered since, like the spider, they appear to have no mouths.

"I'm sure you'll appreciate the biological problems raised by all this. Could such creatures evolve naturally? I really don't think so. They appear to have been *designed*, like machines, for specific jobs. If I had to describe them I would say that they are robots—biological robots—and as such have no analogy on Earth.

"If *Rama* is a spaceship, perhaps they are part of its crew. As to how they are born—or created—that's something I can't tell you. But I can guess that the answer's over there in New York. If Commander Norton and his men can't wait long enough they may encounter increasingly complex creatures, given to unpredictable behavior. Somewhere along the line our explorers may meet the Ramans themselves—the real makers of this world.

"And when *that* happens, gentlemen, there will be no doubt about the answers to these questions."

COMMANDER NORTON was sleeping soundly when his personal communicator dragged him away from happy dreams. He had been holidaying with his family on Mars, flying past the awesome, snow-capped peak of Nix Olympica, mightiest volcano in the solar system. Little Billie had started to say something to him. Now he would never know what it was.

The dream faded. The reality was his executive officer on the ship.

"Sorry to wake you, skipper," said Lieutenant-Commander Kirchoff. "Triple A priority from headquarters."

"Let me have it," Norton answered sleepily.

"I can't. It's in code—Commander's Eyes Only."

Norton was instantly awake. He had received such a message only three times in his whole career—and on each occasion it had meant trouble.

"Damn!" he said. "What do we do now?"

Kirchoff did not bother to answer. Each understood the problem perfectly—it was one that Ship's Orders had never anticipated. Normally a commander was never more than a few minutes away from his office and the code book was in his personal safe. If he started now Norton might get back to the ship, exhausted, in four or five hours. That was not the way to handle a Class AAA Priority.

"Gerry," he said at length. "Who's on the switchboard?"

"No one but myself."

"Recorder off?"

"By an odd breach of regulations—yes."

Norton smiled. Gerry was the best exec he had ever worked with—one who thought of everything.

"Okay, you know where my key is. Call me back."

He waited as patiently as he could for the next ten minutes, trying—without much success—to think of other problems. He hated wasting

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mental effort. It was unlikely that he could outguess the message that was coming and he would know its contents soon enough. Then he could start worrying effectively.

When Kirchoff called back he was obviously speaking under considerable strain.

"It's not really urgent, skipper—an hour won't make any difference. But I prefer to avoid radio. I'll send it down by messenger."

"But why—oh, very well. I trust your judgment. Who will carry it through the airlocks?"

"I'm going myself. I'll call you when I reach the Hub."

"Which leaves Laura in charge."

"For one hour at the most. I'll get right back to the ship."

A medical officer did not have the specialized training to be acting commander, any more than a commander could be expected to do an operation. Both jobs had sometimes been successfully switched, in emergencies, but this was not recommended. Well, one rule had already been broken tonight . . .

"For the record, you will never have left the ship. Have you woken Laura?"

"Yes. She's delighted with the opportunity."

"Lucky that doctors are used to keeping secrets. Oh—have you sent the acknowledgment?"

"Of course. In your name."

"Then I'll be waiting."

Now it was quite impossible to avoid anxious anticipations. *Not really urgent . . . but I prefer to avoid radio . . .*

One thing was certain. The commander was not going to get much more sleep this night.

XXIV

SERGEANT PIETER ROUSSEAU knew why he had volunteered for this job—in many ways, it was a realization of a childhood dream. He had become fascinated by telescopes when he was only six or seven years old and much of his youth had been spent collecting lenses of all shapes and sizes. These he had mounted in cardboard tubes, making instruments of ever-increasing power until he was familiar with the moon and planets, the nearer space stations and the entire landscape within thirty kilometers of his home.

He had been lucky in his place of birth among the mountains of Colorado. In almost every direction the view was spectacular and inexhaustible. He had spent hours exploring, in perfect safety, peaks that every year took their toll of careless climbers. Though he had seen much, he had imagined even more; he had liked to pretend that over each crest of rock, beyond the reach of his telescope, were magic kingdoms full of wonderful creatures. And so for years he had avoided visiting the places his lenses brought to him, because he had known that reality could not live up to the dream.

Now, on the central axis of *Rama* he could survey marvels beyond the wildest fantasies of his youth. A whole world lay spread out before him—a small one, true, yet a man could spend an entire lifetime exploring four thousand square kilometers even when it was dead and changeless.

But now life, with all its infinite possibilities, had come to *Rama.*

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No one knew who had invented the word "biot." It had seemed to come into instant use by a kind of spontaneous generation. From his vantage point on the Hub, Pieter was Biot-Watcher-in-Chief, and he was beginning, so he believed, to understand some of their behavior patterns.

The spiders were mobile sensors, using vision—and probably touch—to examine the whole interior of *Rama.* At one time hundreds of them had been rushing around at high speed, but after less than two days they had disappeared. Now it was quite unusual to see one.

They had been replaced by a whole menagerie of much more impressive creatures—it had been no minor task to think of suitable names for them. There were the window cleaners, with large padded feet, who were apparently polishing their way along the whole length of the six artificial suns. Their enormous shadows, cast across the diameter of the world, sometimes caused temporary eclipses on the far side.

The crab that had demolished *Dragonfly* seemed to be a scavenger. A relay chain of identical creatures had approached Camp Alpha and carried off all the debris that had been neatly stacked on the outskirts. They would have carried off everything else if Norton and Mercer had not stood firm and defied them. The confrontation had been anxious but brief; thereafter the scavengers seemed to distinguish what they were allowed to touch and arrived at regular intervals to see if their services were required. It was a most convenient arrangement and indicated a high degree of intelligence—either on the part of the scavengers themselves or some controlling entity elsewhere.

Garbage disposal on *Rama* was simple—everything was thrown into the sea, where it was presumably broken down into forms that could be used again. The process was rapid: *Resolution* had disappeared overnight, to the great annoyance of Ruby Barnes. Norton had consoled her by pointing out that it had done its job magnificently and that he would never have allowed anyone to use it again in any case. The sharks might not be as discriminating as the scavengers . . .

No astronomer discovering an unknown planet could have been happier than Pieter when he spotted a new type of biot and secured a good photo of it through his telescope. Unfortunately it seemed that all the interesting species were over at the South Pole, where they were performing mysterious tasks around the Horns. Something that looked like a centipede with suction pads could be seen from time to time exploring Big Horn itself, while around the lower peaks Pieter had caught a glimpse of a burly creature that could have been a cross between a hippopotamus and a bulldozer. There was even a double-necked giraffe, which apparently acted as a mobile crane.

Presumably *Rama*, like any ship, required testing, checking and repairing after its immense voyage. The crew was already hard at work—when would the passengers appear?

BIOT-classifying was not Pieter's main job. His orders were to keep watch on the two or three exploring parties that were always

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out, to see that they did not get into trouble and to warn them if anything approached. He alternated every six hours with anyone else who could be spared, though more than once he had been on duty for twelve hours at a stretch. As a result he now knew the geography of *Rama* better than any man who would ever live. It was as familiar to him as the Colorado mountains of his youth.

When Gerry Kirchoff emerged from Airlock Alpha, Pieter knew at once that something unusual was happening. Personnel transfers never occurred during the sleeping period and it was now past midnight by Mission Time. Then Pieter remembered how short-handed they were and was shocked by a much more startling irregularity.

"Gerry—who's in charge of the ship?"

"I am," said Kirchoff coldly as he flipped open his helmet. "You don't think I'd leave the bridge while I'm on watch, do you?"

He reached into his suit carry-all and pulled out a small can still bearing the lable: Concentrated Orange Juice—To Make Five Liters.

"You're good at this, Pieter. The skipper is waiting for it."

Pieter hefted the can, then said, "I hope you've put enough mass inside it. Sometimes they get stuck on the first terrace."

"Well, you're the expert."

That was true enough. The Hub observers had had plenty of practice at sending down small items that had been forgotten or were needed in a hurry. The trick was to get them safely past the low-gravity region and then to see that the Coriolis effect did not carry them too far away from the camp during the eight-kilometer roll downhill.

Pieter anchored himself firmly, grasped the can and hurled it down the face of the cliff. He did not aim directly towards Camp Alpha, but almost thirty degrees away from it.

Almost immediately, air resistance robbed the can of its initial speed, but then the psuedo-gravity of *Rama* took over and it continued to move down, now at a constant velocity. It hit once near the base of the ladder and did a slow-motion bounce which took it clear of the first terrace.

"It's okay now," said Pieter. "Like to make a bet?"

"No," was the prompt reply. "You know the odds."

"You're no sportsman. But I'll tell you now—it will stop within three hundred meters of the camp."

"That doesn't sound very close."

"You might try it some time. I once saw Joe miss by a couple of kilometers."

THE can was no longer bouncing—gravity had become strong enough to glue it to the curving face of the north dome. By the time it had reached the second terrace it was rolling along at twenty or thirty kilometers an hour and had reached very nearly the maximum speed that friction would allow.

"Now we'll have to wait," said Pieter, seating himself at the telescope, so that he could keep track of the messenger. "It will be there in ten minutes. Ah, here comes the skipper—I've gotten used to recognizing people from this angle. Now he's looking up at us."

"I believe that telescope gives you a sense of power."

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"Oh, it does. I'm the only person who knows everything that's happening in *Rama.* At least, I thought I did," he added plaintively, giving Kirchoff a reproachful look.

"If it will keep you happy—the skipper found he'd run out of toothpaste."

Conversation languished after that. At last Pieter said, "Wish you'd taken that bet. He's only got to walk fifty meters . . . now he sees it. Mission complete."

"Thanks, Pieter—a very good job. Now you can go back to sleep."

"Sleep? I'm on watch until oh four hundred."

"Sorry. You must have been sleeping. How else could have dreamed you saw me here?"

SPACE SURVEY H.Q. TO COMMANDER SSS *ENDEAVOR.*

PRIORITY AAA. CLASSIFICATION YOUR EYES ONLY. NO PERMANENT RECORD.

SPACEGUARD REPORTS ULTRA HIGH-SPEED VEHICLE APPARENTLY LAUNCHED MERCURY TEN TO TWELVE DAYS AGO ON *RAMA* INTERCEPT. IF NO ORBIT CHANGE ARRIVAL PREDICTED TIME 322 DAYS 15 HOURS. MAY BE NECESSARY YOU EVACUATE BEFORE THEN. WILL ADVISE FURTHER. C-IN-C.

Norton read the message a half-dozen times to memorize the date. It was hard to keep track of time inside *Rama.* He had to look at his calendar watch to determine that it was now Day 315.

The message was chilling, not only for what it said, but for what it implied. The Hermians had made a clandestine launch. That was in itself breach of Space Law. The conclusion was obvious: their "vehicle" could only be a missile.

But why? It was inconceivable—well, almost inconceivable—that they would risk endangering *Endeavor,* so presumably he would receive ample warning from the Hermians themselves. In an emergency he could leave at a few hours' notice, though he would do so only under extreme protest, at the direct orders of the Commander-in-Chief.

Slowly and thoughtfully he walked across to the improvised life-support complex and dropped the message into an electrosan. The brilliant flare of laser light bursting out through the crack beneath the seat-cover told him that the demands of Security were satisfied. It was too bad, he told himself, that all problems could not be disposed of so swiftly and hygienically.

THE missile was still five million kilometers away when the glare of its plasma braking jets became clearly visible in *Endeavor's* main telescope. By that time the secret was already out and Norton had reluctantly ordered the second and perhaps final evacuation of *Rama.* But he had no intention of leaving until events gave him no alternative.

When it had completed its braking maneuver the unwelcome guest from Mercury was only fifty kilometers from *Rama* and apparently carrying out a survey through its TV cameras. These were clearly visible—one fore and one aft—as were several small omni-antennas and one large directional dish, aimed steadily at the distant lightpoint of Mercury. Norton wondered what instructions were

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coming down that beam and what information was going back.

Yet the Hermians could learn nothing that they did not already know. All that *Endeavor* had discovered had been broadcast throughout the solar system. This spacecraft—which had broken all speed records to get here—could only be an extension of its makers' will, an instrument of their purpose. That purpose would soon be known, for in three hours the Hermian ambassador to the United Planets would be addressing the General Assembly.

Officially the missile did not yet exist. It bore no identification marks and was not radiating on any standard beacon frequency. This was a serious breach of law, but even Spaceguard had not yet issued a formal protest. Everyone was waiting with nervous impatience to see what Mercury would do next.

It had been three days since the missile's existence—and origin—had been announced; all that time, the Hermians had remained stubbornly silent. They could be very good at that when it suited them.

Some psychologists had claimed that it was almost impossible to understand fully the mentality of anyone born and bred on Mercury. Forever exiled from Earth by its three-times-more powerful gravity, Hermians could stand on the moon and look across the narrow gap to the planet of their ancestors, even of their own parents—but they could never visit it. And so, inevitably, they claimed that they did not want to.

They pretended to despise the soft rains, the rolling fields, the lakes and seas, the blue skies—all the things that they could know only through recordings. Because their planet was drenched with such solar energy that the daytime temperature often reached six hundred degrees, they affected a swaggering toughness that did not bear a moment's serious examination. In fact, they tended to be physically weak, since they could only survive if they were totally insulated from their environment. Even if he could have tolerated the gravity, a Hermian would have been quickly incapacitated by a hot day in any equatorial country on Earth.

Yet in matters that really counted they were tough indeed. The psychological pressures of that ravening star so close at hand, the engineering problems of tearing into a stubborn planet and wrenching from it all the necessities of life—these had produced a spartan and in many ways highly admirable culture. You could rely on the Hermians. If they promised something they would deliver, though the bill might be considerable. It was their own joke that if the sun ever showed signs of going nova, they would contract to get it under control once the fee had been settled. It was a non-Hermian joke that any child who showed signs of interest in art, philosophy or abstract mathematics was ploughed straight back into the hydroponic farms. As far as criminals and psychopaths were concerned, being ploughed under was not a joke at all. Crime was one of the luxuries that Mercury could not afford.

Commander Norton had been to Mercury once, had been enormously impressed—like most visitors—and had acquired many Hermian friends. He had fallen in love with a girl in Port Lucifer and had even contem-

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plated signing a three-year contract, but parental disapproval of anyone from outside the orbit of Venus had been too strong. It was just as well.

"Triple A message from Earth, skipper," said the bridge. "Voice and backup text from commander-in-chief. Ready to accept?"

"Check and file text. Let me have the voice."

"Here it comes."

Admiral Hendrix sounded calm and matter of fact, as if he were issuing a routine fleet order instead of handling a situation unique in the history of space. But then, he was not ten kilometers from the bomb.

"C-in-C to Commander, *Endeavor.* This is a quick summary of the situation as we see it now. You know that the General Assembly meets at 14:00 and you'll be listening to the proceedings. It is possible that you may then have to take action immediately and without consultation—hence this briefing.

"We've analyzed the photos you have sent us. The vehicle is a standard space probe, modified for high-impulse and probably laser-riding for initial boost. Size and mass are consistent with fusion bomb in the 500- to 1000-megaton range—the Hermians use up to 100 megatons routinely in their mining operations, so they would have had no difficulty in assembling such a warhead.

"Our experts also estimate that this would be the minimum size necessary to assure destruction of *Rama.* If it were detonated against the thinnest part of the shell—underneath the Cylindrical Sea—the hull would be ruptured and the spin of the body would complete its disintegration.

"We assume that the Hermians, if they are planning such an act, will give you ample time to get clear. For your information, the gamma-ray flash from such a bomb could be dangerous to you up to a range of a thousand kilometers.

"But that is not the most serious danger. The fragments of *Rama*, weighing tons and spinning off at almost a thousand kilometers an hour, could destroy you at an *unlimited* distance. We therefore recommend that you proceed along the spin axis, since no fragments will be thrown off in that direction. Ten thousand kilometers should give an adequate safety margin.

"This message cannot be intercepted—it is going by multiple-pseudo-random routing, so I can talk in clear English. Your reply may not be secure, so speak with discretion and use code when necessary. I will call you immediately after the General Assembly discussion. Message concluded. C-in-C out."

XXV

ACCORDING to the history books—though no one could really believe them—there had been a time when the old United Nations had 172 members. The United Planets had only seven and that was sometimes bad enough. In order of distance from the sun, they were Mercury, Earth, Luna, Mars, Ganymede, Titan and Triton.

The list contained numerous omissions and ambiguities which presumably the future would rectify. Critics never tired of pointing out that most of the United Planets were not planets at all, but satel-

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lites. And how ridiculous that the four giants Jupiter, Saturn, Uranus and Neptune were not included.

But no one lived on the gas giants and quite possibly no one ever would. The same might be true of the other major absentee, Venus. Even the most enthusiastic of planetary engineers agreed that it would take centuries to tame Venus. Meanwhile the Hermians kept their eyes on her and doubtless brooded over long-range plans.

Separate representation for Earth and Luna had also been a bone of contention—the other members argued that it put too much power in one corner of the solar system. But there were more people on the moon than on all the other worlds except Earth itself. And it *was* the meeting place of the UP. Moreover, Earth and moon hardly ever agreed on anything, so they were not likely to constitute a dangerous bloc.

Mars held the asteroids in trust—except for the Icarian group (supervised by Mercury) and a handful with perihelions beyond Saturn and thus claimed by Titan. One day the larger asteroids, such as Pallas, Vesta, Juno and Ceres, would be important enough to have their own ambassadors and membership of the UP would then reach two figures.

Ganymede represented not only Jupiter—and therefore more mass than all the rest of the solar system put together—but also the remaining fifty or so Jovian satellites, if one included temporary captures from the asteroid belt (the lawyers were still arguing over this). In the same way, Titan took care of Saturn, its rings and the other thirty-plus satellites.

The situation for Triton was even more complicated. The large moon of Neptune was the outermost body in the solar system under permanent habitation. As a result its ambassador wore a considerable number of hats. He represented Uranus and its eight moons (none yet occupied); Neptune and its other three satellites; Pluto and its solitary moon; and lonely, moonless Persephone. If there were planets beyond Persephone they, too, would be Triton's responsibility. And as if that were not enough, the Ambassador for the Outer Darkness, as he was sometimes called, had been heard to ask plaintively, "What about comets?" It was generally felt that this problem could be left for the future to solve.

And yet, in a very real sense, that future was already here. By some definitions, *Rama* was a comet. Comets were the only other visitors from the interstellar deeps and many had traveled on hyperbolic orbits even closer to the sun than *Rama's*. Any space lawyer could make a good case out of that, and the Hermian Ambassador was one of the best.

"WE RECOGNIZE His Excellency the Ambassador for Mercury."

As the delegates were arranged counterclockwise in order of distance from the sun, the Hermian was on the president's extreme right. Up to the very last minute he had been interfacing with his computer. Now he removed the synchronizing spectacles which allowed him alone to read the message on the display screen. He picked up his sheaf of

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notes and rose briskly.

"Mr. President, distinguished fellow delegates, I would like to begin with a brief summary of the situation which now confronts us."

From some delegates, that phrase "a brief summary" would have evoked silent groans among all listeners, but everyone knew that Hermians meant exactly what they said.

"The giant spaceship, or artificial asteroid, which has been christened *Rama* was detected over a year ago in the region beyond Jupiter. At first it was believed to be a natural body, moving on a hyperbolic orbit which would take it around the sun and on to the stars.

"When its true nature was discovered, the Solar Survey Vessel *Endeavor* was ordered to rendezvous with it. I am sure we will all congratulate Commander Norton and his crew for the efficient way in which they have carried out their unique assignment.

"After first actual contact *Rama* was still believed to be dead—frozen for so many hundreds of thousands of years that there was no possibility of revival. This may still be true, in a strictly biological sense. There seems general agreement, among those who have studied the matter, that no living organism of any complexity can survive more than a very few centuries of suspended animation. Even at absolute zero, residual quantum effects eventually erase too much cellular information to make revival possible. It therefore appeared that, although *Rama* was of enormous archeological importance, it did not present any major astropolitical problems.

"It is now obvious that this was a very naive attitude, though even from the first there were some who pointed out that *Rama* was too precisely aimed at the sun for pure chance to be involved.

"Even so, it might have been argued—indeed, it was argued—that here was an experiment that had failed. *Rama* had reached the intended target, but the controlling intelligence had not survived. This view also seems very simple-minded. It surely underestimates the entities we are dealing with.

"What we failed to take into account was the possibility of non-biological survival. If we accept Dr. Perera's very plausible theory, which certainly fits all the facts, the creatures who have been observed inside *Rama* did not exist until a short time ago. Their patterns, or templates, were stored in some central information bank and when the time was ripe they were manufactured from available raw materials, presumably the metallo-organic soup of the Cylindrical Sea. Such a feat is still somewhat beyond our own ability, but does not present any theoretical problems. We know that solid state circuits, unlike living matter, can store information without loss for indefinite periods of time.

"So *Rama* is now in full operating condition, serving the purpose of its builders—whoever they may be. From our point of view, it does not matter if the builders themselves have all been dead for a million years, or whether they too will be recreated to join their servants at any moment. With or without them, their will is being done.

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and will continue to be done.

"*Rama* has now given proof that its propulsion system is still operating. In a few days it will be at perihelion, where it would logically make any major orbit change. We may therefore soon have a new planet moving through the solar system over which my government has jurisdiction. Or it may, of course, make additional changes and occupy a final orbit at any distance from the sun. It could even become a satellite of a major planet—such as Earth.

"We are therefore, fellow delegates, faced with a whole spectrum of possibilities, some of them very serious indeed. It is foolish to pretend that these creatures must be benevolent and will not interfere with us in any way. If they came to our solar system they need something from it. Even if it is only scientific knowledge, consider how that knowledge may be used.

"What confronts us now is a technology hundreds—perhaps thousands—of years in advance of ours, and a culture which may have no points of contact whatsoever with ours. We have been studying the behavior of the biological robots—the biots—inside *Rama* as shown on the films that Commander Norton has relayed, and we have arrived at certain conclusions we wish to pass on to you.

"On Mercury we are perhaps unlucky in having no indigenous life forms to observe. But we have, of course, a complete record of terrestrial ecology and we find in it one striking parallel with *Rama.*

"This is the termite colony. Like *Rama,* it is an artificial world with a controlled environment. Like *Rama,* its functioning depends upon a whole series of specialized biological machines—workers, builders, farmers—warriors. And although we do not know if *Rama* has a Queen, I suggest that the island known as New York serves a similar function.

"Now, it would obviously be absurd to press this analogy too far. It breaks down at many points. But I put it to you for this reason.

"What degree of cooperation or understanding would ever be possible between human beings and termites? When there is no conflict of interest, we tolerate each other. But when either needs the other's territory or resources no quarter is given.

"Thanks to our technology and our intelligence, we have always won and will continue to win if we are sufficiently determined. But sometimes it is not easy and there are those who believe that in the long run final victory may yet go to the termites.

"With this in mind, consider now the appalling threat that *Rama* may—I do not say must—present to human civilization. What steps have we taken to counter it if the worst eventuality should occur? None whatsoever. We have merely talked and speculated and written learned papers.

"Well, my fellow delegates, Mercury has done more than this. Acting under the provisions of Clause thirty-four of the Space Treaty of two thousand fifty-seven, which entitles us to take any steps necessary to protect the integrity of our solar space, we have dispatched a high-energy nuclear device to *Rama.* We

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will indeed be happy if we never have to utilize it. But now, at least, we are not helpless—as we were before.

"It may be argued that we have acted unilaterally and without prior consultation. We admit that. But does anyone here imagine—with all respect, Mr. President—that we could have secured any agreement on this matter in the time available? We consider that we are acting not only for ourselves, but for the whole human race. All future generations may one day thank us for our foresight.

"We recognize that it would be a tragedy, even a crime, to destroy an artifact as wonderful as *Rama*. If there is any way in which this can be avoided, without risk to humanity, we will be very happy to hear of it. We have not found a way and time is running out.

"Within the next few days, before *Rama* reaches perihelion, the choice will have to be made. We will, of course, give ample warning to *Endeavor*. But we would advise Commander Norton always to be ready to leave at an hour's notice. It is conceivable that *Rama* may undergo further dramatic transformations at any moment.

"That is all, Mr. President, fellow delegates. I thank you for your attention. I look forward to your cooperation."

XXVI

"WELL, Rod, how do the Hermians fit into your theology?"

"Only too well, Commander," replied Lieutenant Rodrigo with a humorless smile. "It's the age-old conflict between the forces of good and the forces of evil. And there are times when men have to take sides in such a conflict."

I thought it would be something like that, Norton told himself. This situation must have been a shock to Boris, but he would not have resigned himself to passive acquiesence. The Cosmo-Christers were very energetic, competent people. Indeed, in some ways they were remarkably like the Hermians.

"I take it you have a plan, Rod."

"Yes, Commander. It's really quite simple. We merely have to disable the bomb."

"Oh? And how do you propose to do that?"

"With a small pair of wire-cutters."

If the suggestion had been made by anyone else Norton would have assumed that it was intended as a joke. But Boris Rodrigo did not joke about most matters.

"Now just a minute—the probe is bristling with cameras. Do you suppose the Hermians will just sit and watch you?"

"Of course. That's all they can do. When the signal reaches them it will be far too late for them to do anything else. I can easily finish the job in ten minutes."

"I see. They certainly will be mad. But suppose the bomb is boobytrapped so that interference sets it off."

"That seems very unlikely—what would be the purpose? This bomb was built for a specific deep-space mission and it will be fitted with all sorts of safety devices to prevent

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detonation except on a positive command. But that's a risk I'm prepared to take. And it can be done without endangering the ship. I've worked everything out."

"I'm sure you have," said Norton. The idea was almost seductive in its appeal. He particularly liked the thought of frustrated Hermians and stood ready to give a good deal to record their reactions when they realized—too late—what was happening to their deadly toy.

But there were other complications and these seemed to multiply as Norton surveyed the problem. He was facing by far the most difficult, and the most crucial, decision of his entire career.

And that was a ridiculous understatement. He was faced with the most difficult decision any commander had ever had to make—the future of the entire human race might well depend upon it. For just suppose the Hermians were right?

WHEN Rodrigo had left he switched on the Do Not Disturb sign. He could not remember when he had last used it and was mildly surprised that it was working. Now, in the heart of his crowded, busy ship, he was completely alone—except for the portrait of Captain James Cook gazing at him down the corridors of time.

It was impossible to consult with Earth. He had already been warned that any messages might be tapped, perhaps by relay devices on the bomb itself. That left the whole responsibility in his hands.

He could do nothing and simply wait until the Hermians advised him to leave. How would that look in the histories of the future? Norton was not greatly concerned with posthumous fame or infamy, yet he did not care to be remembered forever as the accessory to a cosmic crime it had been in his power to prevent.

And Rodrigo's plan was flawless. As Norton had expected, Rodrigo had worked out every detail, anticipated every possibility, even the remote danger that the bomb might be triggered when tampered with. If that happened *Endeavor* would still be safe behind the shield of *Rama*. As for Lieutenant Rodrigo himself—he seemed to regard the possibility of instant apotheosis with complete equanimity.

To act, or not act—that was the question. Whatever he did, the possibilities for good and evil seemed in perfect balance. He was faced with the most morally difficult of all decisions. If his choice turned out wrong he would know very quickly. But if he were correct he might never be able to prove it.

The time had come to listen to his inner voices.

He pressed the call button for the bridge circuit and said slowly, "Lieutenant Rodrigo—I'd like to see you."

Then he closed his eyes, hooked his thumbs in the restraining straps of his chair and prepared to enjoy a few moments of total relaxation.

It might be some time before he would experience it again.

THE scooter had been stripped of all unnecessary equipment—it was now merely an open framework holding together propulsion, guidance and life-support systems. Even

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the seat for the second pilot had been removed, for every kilogram of extra mass had to be paid for in mission time.

That was one of the reasons, though not the most important, why Rodrigo had insisted on going alone. It was such a simple job that there was no need for any extra hands and the mass of a passenger would cost several minutes of flight time. Now the stripped-down scooter could accelerate at over a third of a gravity and could make the trip from *Endeavor* to the bomb in four minutes. That left six to spare—they should be sufficient.

Rodrigo looked back only once when he had left the ship. He saw that, as planned, *Endeavor* had lifted from *Rama's* central axis and was thrusting gently away across the spinning disk of the North Face. By the time he reached the bomb she would have placed the thickness of *Rama* between them.

He took his time, flying over the polar plain. There was no hurry here because the bomb's cameras could not yet see him and he could therefore conserve fuel. Then he drifted over the curving rim of the world—and there was the missile, glittering in sunlight fiercer even than that shining on the planet of its birth.

Rodrigo had already punched in the guidance instructions. He initiated the sequence. The scooter spun on its gyros and came up to full thrust in a matter of seconds. At first the sensation of weight seemed crushing but Rodrigo adjusted to it. He had, after all, comfortably endured twice as much inside *Rama* and had been born under three times as much on Earth.

The huge, curving exterior wall of the forty-kilometer cylinder was slowly falling away beneath him as the scooter aimed itself directly at the bomb. Yet it was impossible to judge *Rama's* size, since it was completely smooth and featureless—so featureless, indeed, that it was difficult to tell that it was spinning.

One hundred seconds into the mission: he was approaching the halfway point. The bomb was still too far away to show any details, but it was much brighter against the jet-black sky. It was strange to see no stars nor even brilliant Earth or dazzling Venus. The dark filters that protected his eyes against the deadly glare made sightseeing impossible. Rodrigo guessed that he was breaking a record; probably no other man had ever engaged in extra-vehicular work so close to the sun. Luckily solar activity was low.

At two minutes, ten seconds the flip-over light started flashing. Thrust dropped to zero and the scooter spun through 180 degrees. Full thrust was back in an instant, but now he was decelerating at the same mad rate of three meters per second squared—rather better than that, in fact, since he had lost almost half his propellant mass. The bomb was twenty-five kilometers away; he would be there in another two minutes. He had hit a top speed of fifteen hundred kilometers an hour, utter insanity for a space scooter and probably another record. But this was hardly a routine EVA and he knew precisely what he was doing.

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THE bomb was growing. He could now see the main antenna holding steady on the invisible star of Mercury. Along that beam the image of his approaching scooter had been flashing at the speed of light for the last three minutes. There were still two to go before it reached Mercury.

What would the Hermians do when they saw him? There would be consternation, of course. They would realize instantly that he had made a rendezvous with the bomb several minutes before they had even known he was on the way. Probably the first observer to detect him would call higher authority. That would take more time. But even in the worst possible case—even if the observer on duty had authority to detonate the bomb and pressed the button immediately—it would take another five minutes for the signal to reach the bomb.

Though Rodrigo was not gambling on it—Cosmo-Christers never gambled—he was quite sure that there would be no such instantaneous reaction. The Hermians would hesitate to destroy a reconnaissance vehicle from *Endeavor*, even if they suspected its motives. They would certainly attempt some form of communication first. Too, they would not want to waste a gigaton bomb on a mere scooter, and wasted it would be if it were detonated twenty kilometers from its target. They would want to move it first.

Rodrigo was sure he had plenty of time, but he still planned to assume the very worst. He meant to act as if the bomb's triggering impulse would arrive in the shortest possible time—in just five minutes.

As the scooter closed in across the last few hundred meters Rodrigo quickly matched the details he could now see with those he had studied in photographs taken at long range.

The bomb was a cylinder about ten meters long and three in diameter—by a strange coincidence its proportions nearly matched those of *Rama*. It was attached to the framework of the carrier vehicle by an open latticework of short I-beams. For some reason, probably having to do with the location of the center of mass, it was supported at right angles to the axis of the carrier, so that it conveyed an appropriately sinister hammerhead impression. It was indeed a hammer: one powerful enough to smash a world.

From each end of the bomb a bundle of braided cables ran along the cylindrical side and disappeared through the latticework into the interior of the vehicle. All communications and controls were here—there was no antenna of any kind on the bomb itself. Rodrigo had only to cut those two sets of cables and there would be nothing here but harmless, inert metal.

Although this was exactly what he had expected, the job now seemed a little too easy. He glanced at his watch. It would be another thirty seconds before the Hermians, even if they had been watching when he rounded the edge of *Rama*, could know of his existence. He had an absolutely certain five minutes for uninterrupted work and a 99 per cent probability of much longer than that.

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As soon as the scooter had drifted to a complete halt Rodrigo grappled it to the missile framework, so that the two formed a rigid structure. That took only seconds. He had already chosen his tools and was out of the pilot's seat at once, only slightly hampered by the stiffness of his heavy-insulation suit.

The first thing he found himself inspecting was a small metal plate bearing the inscription:

DEPARTMENT OF
POWER ENGINEERING
Section D.
47 Sunset Boulevard,
Vulcanopolis 17464
For information: apply
to Henry K. Jones.

Rodrigo suspected that in a very few minutes Mr. Jones might be rather busy.

The heavy wirecutters made short work of the cable. As the first strands parted Rodrigo gave scarcely a thought to the fires of hell that were pent up only centimeters away. If his actions triggered them he would never know.

He glanced again at his watch. He had spent less than a minute, which meant that he was on schedule. Now for the backup cable—and then he could head for home in full view of the furious and frustrated Hermians.

He was just beginning to work on the second cable assembly when he felt a faint vibration in the metal he was touching. Startled, he looked back along the body of the missile.

The characteristic blue-violet glow of a plasma thruster in action was hovering around one of the attitude control jets. The bomb was preparing to move.

THE message from Mercury was brief and devastating. It arrived two minutes after Rodrigo had disappeared around the edge of *Rama*.

> COMMANDER ENDEAVOR FROM MERCURY SPACE CONTROL, INFERNO WEST. YOU HAVE ONE HOUR FROM RECEIPT OF THIS MESSAGE TO LEAVE VICINITY OF *RAMA*. SUGGEST YOU PROCEED MAXIMUM ACCELERATION ALONG SPIN AXIS. PLEASE ACKNOWLEDGE. MESSAGE ENDS.

Norton read it with disbelief and anger. He felt a childish impulse to radio back that all his crew was inside *Rama*, and it would take hours to get everyone out. But that would achieve nothing—except perhaps to test the will and nerve of the Hermians.

And why had they decided to act several days before *Rama* reached perihelion? He wondered if the mounting pressure of public opinion had become too great and they had decided to present the rest of the human race with a *fait accompli*. It seemed an unlikely explanation; such sensitivity would have been uncharacteristic.

There was no way Norton could recall Rodrigo, for the scooter was now in the radio shadow of *Rama* and would be out of contact until they were in line of sight again. That would not happen until the mission was completed—or had failed.

Norton would have to wait it

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out. He still had plenty of time—a full fifty minutes. Meanwhile, he had decided on the most effective answer to Mercury.

He would ignore the message completely and see what the Hermians did next.

RODRIGO'S first sensation was not one of physical fear—it was something much more devastating. He believed that the universe operated accorded to strict laws that not even God Himself could disobey, much less the Hermians. No message could travel faster than light. He was five minutes ahead of anything that Mercury could do.

That the bomb was starting to move could only be a coincidence—fantastic, and perhaps deadly, but no more than that. By chance, a control signal must have been sent to the bomb at about the time he was leaving *Endeavor*. While he had been traveling fifty kilometers it had covered eighty million.

Or perhaps the bomb's movement was only an automatic change of attitude to counter the overheating somewhere in the vehicle. There were places where the skin temperature approached fifteen hundred degrees and Rodrigo had been careful to keep as much in the shadows as possible.

A second thruster started to fire, checking the spin given by the first, so this was not a mere thermal adjustment. The bomb was reorienting itself to point toward *Rama*.

Useless to wonder why this was happening at this precise moment in time. There was one thing in his favor—the missile was a low-acceleration device. A tenth of a gee was the most that it could manage. He could hang on.

He checked the grapples attaching the scooter to the bomb's framework and rechecked the safety line on his own suit. A cold anger was growing in his mind, adding to his determination. Did this maneuver mean that the Hermians were going to explode the bomb without warning, giving *Endeavor* no chance to escape? That seemed incredible—an act not only of brutality but of folly, calculated to turn the rest of the solar system against Mercury. And what would have made the Hermians ignore the solemn promise of their own ambassador?

Whatever their plan, they would not get away with it.

THE second message from Mercury was identical with the first and arrived ten minutes later. So they had extended the deadline—Norton still had one hour. They had obviously waited until a reply from *Endeavor* could have reached them before calling him again.

Now there was another factor; by this time they must have seen Rodrigo and would have had several minutes in which to take action. Their instructions to the bomb could already be on the way and might arrive at any second.

He should be preparing to leave the area. At any moment the sky-filling bulk of *Rama* might become incandescent along the edges, blazing with a transient glory that would far outshine the sun.

WHEN the main thrust came on Rodrigo was securely an-

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chored. Only twenty seconds later it cut off again. He did a quick mental calculation and decided the bomb at its present rate of speed would take over an hour to reach *Rama*. Perhaps it was only moving in close to get a quicker reaction. If so, the precaution was a wise one, but the Hermians had taken it too late.

Rodrigo glanced at his watch, though by now he was almost aware of the time without having to check. Observers on Mercury would now be seeing him heading purposefully toward the bomb and less than two kilometers away from it. They could have no doubt of his intentions and would be wondering if he had already carried them out.

The second set of cables were severed as easily as the first. Like any good workman, Rodrigo had chosen his tools well. The bomb was disarmed or, to be more accurate, it could no longer be detonated by remote command.

One other danger remained and Rodrigo could not afford to ignore it. There were no external contact fuses, but there might be internal ones that would be armed by the shock of impact. The Hermians still had control over their vehicle's movement and could crash it into *Rama* whenever they wished. Rodrigo's work was not yet completed.

Five minutes from now, in that control room somewhere on Mercury, they would see him crawling back along the exterior of the missile, carrying the modest wire-cutters that had neutralized the mightiest weapon ever built by man. He was almost tempted to wave at the camera, but decided that the gesture would be undignified. He was, after all, making history and millions would watch this scene in the years to come. Unless, of course, the Hermians destroyed the recording in a fit of pique—for which he would hardly blame them.

He reached the mounting of the long-range antenna and drifted hand-over-hand along it to the big dish. His faithful cutters made short work of the multiplex feed system, chewing up cables and laser wave guides alike. When he made the last snip the antenna started to swing slowly around. The unexpected movement took him by surprise until he realized that he had destroyed the automatic communications lock on Mercury. Exactly five minutes from now the Hermians would lose all contact with their servant. Not only was it impotent—now it was blind and deaf.

Rodrigo climbed slowly back to the scooter, released the shackles and swung it around until the forward bumpers were pressing against the missile, as close as possible to its center of mass. He brought thrust up to full power and held it there for twenty seconds.

Pushing against many times its own mass, the scooter responded very sluggishly. When Rodrigo cut the thrust back to zero he took a careful reading of the bomb's new velocity vector.

It would miss *Rama* by a wide margin—and it could be located again with precision at any future time. It was, after all, a valuable piece of equipment.

Lieutenant Rodrigo was a man of almost pathological honesty. He would not like the Hermians to accuse him of losing their property.

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XXVII

"DARLING," Norton began, "this nonsense has cost us more than a day, but at least it's given me a chance to talk to you.

"I'm still in the ship and she's heading back to station at the polar axis. We picked up Rod an hour ago, looking as if he'd just come off duty after a quiet watch. I suppose neither he nor I will ever be able to visit Mercury again and I'm wondering if we're going to be treated as heroes or villains when we get back to Earth. But my conscience is clear. I'm sure we did the right thing. I wonder if *Rama* will ever say, 'Thank you.'

"We can stay here only two more days. Unlike *Rama*, we don't have a kilometer-thick skin to protect us from the sun. The hull's already developing dangerous hotspots and we've had to put out some local screening. I'm sorry. I didn't want to bore you with my problems. At any rate, there's time for just one more trip into *Rama* and I intend to make the most of it. But don't worry—I'm not taking any chances."

He stopped the recording. He was, to say the least, stretching the truth. A sense of danger and uncertainty filled all his moments inside *Rama*. No man could ever feel really at home there, in the presence of forces beyond his understanding. And on this final trip, now that he knew he could never return and that no future operations would be risked, he intended to press his luck just a little further. He resumed:

"In forty-eight hours, then, we'll have completed this mission. What happens afterward is still uncertain. As you know, we've used virtually all our fuel getting into this orbit. I'm still waiting to hear if a tanker can rendezvous with us in time to get us back to Earth, or whether we'll have to make planetfall on Mars. Anyway, I should be home by Christmas. Tell Junior I'm sorry I can't bring a baby biot—there's no such animal.

"We're all fine, but very tired. I've earned a long leave after all this and you and I will make up for lost time. Whatever others say about me, you can claim you're married to a hero. How many wives have husbands who have literally saved a world?"

As always, he listened carefully to the tape before duping it, to make sure that it was applicable to both his families. It was strange to think that he did not know which of them he would see first. Usually his schedule was determined at least a year in advance, by the inexorable movements of the planets themselves.

But that had been in the days before *Rama*. Now nothing would ever be the same again.

"IF WE try it," said Karl Mercer, "do you think the biots will stop us?"

"That's one of the things I want to find out. Why are you looking at me like that?"

"I was wondering, Commander, if you think you own *Rama*. Until now you've vetoed any attempt to cut into buildings. Why the switch? Have the Hermians given you ideas?"

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Norton laughed, then suddenly checked himself. It was a shrewd question. He himself was not sure if the obvious answers were the right ones.

"I may have been ultra-cautious—I've tried to avoid trouble. But this is our last chance. If we're forced to retreat in a hurry we won't have lost much."

"Assuming that we retreat in good order."

"Of course. But the biots have never shown hostility. And except for the spiders, I don't believe there's anything here that can catch us if we do have to run for it."

"You may run, skipper, but I intend to leave with dignity. Incidentally, I've decided why the biots are so polite to us."

"It's a little late for a new theory."

"Here it is anyway. They think we're Ramans. They can't tell the difference between one oxy-eater and another."

"I don't believe they're that stupid."

"It's not a matter of stupidity. They've been programed for their particular jobs and we simply don't come into their frame of reference."

"Perhaps you're right. We may find out as soon as we start work on London."

JOE CALVERT had always enjoyed—those old bank-robbery movies, but he had never expected to be involved in one. Yet breaking and entering was what he was doing now.

The deserted streets of "London" seemed full of menace, though he knew that mostly his guilty conscience was bothering him. He did not really believe that the sealed and windowless structures ranged all around were full of watchful inhabitants, waiting to emerge in angry hordes as soon as the invaders laid a hand on their property. In fact, he was quite certain that this whole complex—like all the other towns—was merely some kind of storage area.

Yet his second fear, also based on innumerable ancient crime dramas, might be better grounded. His activities might not evoke clanging alarm bells and screaming sirens, but it was reasonable to assume that *Rama* would have some kind of warning system. Or how did the biots know when and where their services were needed?

There was a smell of nitric oxides as the air itself started to burn in the beam of Joe's laser torch, and a steady sizzling as the fiery knife sliced toward secrets that had been hidden since the birth of man. Nothing material could resist this concentration of power and the cut proceeded smoothly at a rate of several meters a minute. In a remarkably short time a section large enough to admit a man had been sliced out.

As the cutaway section showed no sign of moving Sergeant Myron tapped it gently—then harder—then banged on it with all his strength. It fell inwards with a hollow, reverberating crash.

Once again, as he had done during that very first entrance into *Rama,* Norton remembered the archeologist who had opened the old Egyptian tomb. He did not expect to see the glitter of gold; in

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fact, he entertained no preconceived ideas at all as he crawled through the opening, his flashlight held in front of him.

A Greek temple made of glass—that was his first impression. The building was filled with row upon row of vertical crystalline columns, about a meter wide and stretching from floor to ceiling. Hundreds of them marched away into the darkness beyond the reach of his light.

Norton walked toward the nearest column and directed his beam into its interior. Refracted as if through a cylindrical lens, the light fanned out on the far side to be focused and refocused, losing brilliance with each repetition in the array of pillars beyond. He felt that he was in the middle of some complicated demonstration in optics.

"Very pretty," said the practical Mercer, "but what does it mean? Who needs a forest of glass pillars?"

Norton rapped gently on the column. It sounded solid, though more metallic than crystalline. He was completely baffled and so followed a piece of useful advice he had heard long ago: *When in doubt, say nothing and move on.*

As he reached the next column, which looked exactly like the first, he heard an exclamation of surprise from Mercer.

"I could have sworn this pillar was empty. Now there's something inside it."

Norton glanced back quickly.

"Where? I don't see anything."

HE FOLLOWED the direction of Mercer's pointing finger. It was aimed at nothing; the column was still completely transparent.

"You can't see it?" Mercer asked incredulously. "Come around to this side. Damn—now I've lost it!"

"What's going on here?" demanded Calvert. It was several minutes before he got even the first approximation to an answer.

The columns were not transparent from every angle or under all illumination. As one walked around them, objects would suddenly flash into view, apparently embedded like flies in amber, and would then disappear again. There were dozens of them, all different. They looked real and solid, yet many seemed to occupy the identical spaces.

"Holograms," said Calvert, "Just like a museum on Earth."

That was the obvious explanation, therefore Norton viewed it with suspicion. His doubts grew as he examined the other columns and either discovered or conjured up the images stored in their interiors—he was not sure which.

He thought he could identify hand tools (though for huge and peculiar hands), containers, small machines with keyboards that seemed to have been made for more than five fingers, scientific instruments, startlingly conventional domestic utensils, including knives and plates which, apart from their size, would have not attracted a second glance on any terrestrial table. They were all there, with hundreds of less identifiable objects, often jumbled up together in the same pillar. A museum, surely, would have some logical arrangement, some segregation of related items. What he saw seemed to be a completely random collection of hardware.

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"All right. Let's try the cameras on these," he said. "They might make sense to somebody."

The crew had photographed the elusive images inside a score of the crystal pillars when the sheer variety of items gave Norton a clue. Perhaps this was not a collection, but a catalog, indexed according to some arbitrary but perfectly logical system. He thought of the wild juxtapositions that any dictionary or alphabetized list will give, and tried out the idea on his companions.

"I see what you mean," said Mercer. "The Ramans might be equally surprised to find us putting—ah—camshafts next to cameras."

"Or books beside boots," added Calvert, after several seconds of hard thinking. One could play this game for hours, he decided, with increasing degrees of impropriety.

"That's the idea," replied Norton. "This may be an indexed catalog for three-D images—templates—solid blueprints, if you like."

"For what purpose?"

"Well, you know the theory about the biots, the idea that they don't exist until they're needed and then they're created—synthesized—from patterns stored somewhere?"

"I see," said Mercer, slowly and thoughtfully. "So when a Raman needs a left-handed blivet he punches out the correct code number and a copy is manufactured from the pattern in here."

"Something like that. But please don't ask me about the practical details."

The pillars among which they had been moving had been steadily growing in size and were now more than two meters in diameter. The images were correspondingly larger; it was obvious that, for doubtless excellent reasons, the Ramans believed in sticking to a one-to-one scale. Norton wondered how they stored anything *really* big.

TO INCREASE their rate of coverage the four explorers spread out and were taking photographs as quickly as they could get their cameras focused on the fleeting images. This was an astonishing piece of luck, Norton told himself, though he felt that he had earned it—they could not possibly have made a better choice than this Illustrated Catalog of Raman artifacts. And yet, in another way, it could hardly have been more frustrating. There was nothing actually here except impalpable patterns of light and darkness. These apparently solid objects did not really exist.

Even knowing this, more than once Norton felt an almost irresistible urge to laser his way into one of the pillars, so that he could have something material to take back to Earth. It was the same impulse, he told himself wryly, that would prompt a monkey to grab the reflection of a banana in a mirror.

He was photographing what seemed to be some kind of optical device when Calvert's shout started him running through the pillars.

"Skipper—Karl—Will—look at this!"

Joe was prone to sudden enthusiasms, but what he had found now was enough to justify any amount of excitement.

Inside one of the two-meter

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columns was an elaborate harness or uniform, obviously made for a vertical creature much taller than a man. A narrow central metal band apparently surrounded the waist, thorax, or some division unknown to terrestrial zoology. From this rose three slim columns, tapering outward and ending in a perfectly circular belt, an impressive meter in diameter. Loops equally spaced along it could only be intended to go around upper limbs or arms—three of them.

There were numerous pouches, buckles, bandoliers from which tools (or weapons?) protruded, pipes and electrical conductors, even small black boxes that would have looked perfectly at home in an electronics lab on Earth. The whole arrangement was almost as complex as a spacesuit, though it obviously provided only partial covering for the creature wearing it.

"About two and a half meters high," said Mercer thoughtfully, "not counting the head—whatever that was like."

"With three arms and presumably three legs. The same plan as the spiders, but on a much more massive scale. Do you suppose that's a coincidence?"

"Probably not. We design robots in our own image. We might expect the Ramans to do the same."

Joe Calvert, unusually subdued, was looking at the display with something like awe.

"Do you suppose they know we're here?"

"I doubt it," said Mercer. "We haven't even reached their threshold of consciousness, though the Hermians certainly had a good try."

They were still standing there, unable to drag themselves away, when Pieter called from the Hub, his voice full of urgent concern.

"Skipper—you'd better get outside."

"What is it—biots heading this way?"

"No—something much more serious is happening. The lights are going out."

XXVIII

WHEN he hastily stepped outside, it seemed to Norton that the six suns of *Rama* were as brilliant as ever. Pieter, he thought, had made a mistake . . .

Pieter had anticipated his reaction.

"It happened so slowly," he explained, "that it was a long time before I noticed any difference. But there's no doubt about it. I've taken a meter reading. The light level's down forty per cent."

Now, as his eyes readjusted themselves after the gloom of the glass temple, Norton could believe him. The long day of *Rama* was drawing to its close.

It was still as warm as ever, yet Norton felt himself shivering. He had known this sensation once before, during a beautiful summer day on Earth. There had been an inexplicable weakening of light as if darkness were falling from the sky, though not a cloud had been visible. Then he remembered—a partial eclipse had been in progress.

"This is it," he said grimly. "We're going home. Leave all the equipment behind. We won't need it again."

Now, he hoped, one piece of planning was about to prove its

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worth. He had selected London for this raid because no other town was so close to a stairway. The foot of Beta was only four kilometers away.

The men set out at a steady, loping trot, the most comfortable mode of traveling at half a gravity. Norton set a pace which, he estimated, would get them to the edge of the plain without exhaustion and in minimum time. He was acutely aware of the eight kilometers they would still have to climb when they had reached Beta, but he would feel much safer when they had actually started the ascent.

The first tremor came when they had almost reached the stairway. It was very slight and instinctively Norton turned toward the south, expecting to see another display of fireworks around the Horns. But *Rama* never seemed to repeat itself exactly. If there were any electrical discharges above those needle-sharp mountains they were too faint to be seen.

"Bridge," he called, "did you notice that?"

"Yes, skipper. Very small shock. Could be another attitude change. We're watching the rate gyro. Nothing yet. Just a minute! Positive reading. Can just detect it—less than a microradian per second, but holding."

So *Rama* was beginning to turn, though with almost imperceptible slowness. Those earlier shocks might have been a false alarm but this, surely, was the real thing.

"Rate increasing—five microrad. Hello, did you feel *that* shock?"

"We certainly did. Get all ship's systems operational. We may have to leave in a hurry."

"Do you expect an orbit change already? We're still a long way from perihelion."

"I don't think *Rama* works by our textbooks. We're just about at Beta. We'll rest here for five minutes."

Five minutes was utterly inadequate, yet it seemed an age. For there was now no doubt that the light was failing and failing fast. Though they were all equipped with flashlights, the thought of darkness here was now intolerable. They felt an overwhelming urge to escape, to get out into the light of the sun, a kilometer away on the other side of these cylindrical walls.

Norton called Hub. "Is the searchlight operating? We may need it in a hurry."

"Yes, skipper. Here it comes."

A REASSURING spark of light started to shine eight kilometers above their heads. Even against the fading day of *Rama* it looked surprisingly feeble, but it had served them before and would guide them once again if they needed it.

This, Norton was grimly aware, would be the longest and most nerve-wracking climb they had ever made. Whatever happened, it would be impossible to hurry. If they overexerted themselves they would simply collapse somewhere on that vertiginous slope and would have to wait until their protesting muscles permitted them to continue. By this time, he thought, he and his men had to be one of the fittest crews that had ever carried out a space mission. Still, *Rama* imposed limits to what flesh and blood could do.

After an hour's steady plodding they had reached the fourth section

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of the stairway, about three kilometers from the plain. From now on travel would be easier—gravity was already down to a third of Earth value. Although there had been minor shocks from time to time, no other unusual phenomena had occurred and there was still plenty of light. Norton began to feel more optimistic and even wondered if he had cut off the exploration of the crystal pillars too soon. One thing was certain, however: there was no going back. He and those with him had walked for the last time on the plain of *Rama*.

It was while they were taking a ten-minute rest on the fourth platform that Joe Calvert suddenly asked, "What's that noise, skipper?"

"I don't hear anything."

"High-pitched whistle—dropping in frequency. You don't hear it?"

"Your ears are younger than mine—oh, now I catch it."

The whistle seemed to come from everywhere. Soon it was loud and piercing, then fell swiftly in pitch. Suddenly it stopped.

A few moments later it came again, repeating the same sequence. Despite its alienness the sound had the mournful, compelling quality of a lighthouse siren sending out its warnings into the fog-shrouded night. It held a message—and an urgent one. It was not designed for their ears, yet they caught the sense of it. Then, as if to make doubly sure, it was reinforced by the lights themselves.

They dimmed almost to extinction, then started to flash. Brilliant beads like ball lightning raced along the six narrow valleys that had moments earlier illuminated this world. They moved from both poles towards the sea in a synchronized, hypnotic rhythm which could have only one meaning. *To the sea!* the lights were calling, *To the sea!* And the summons was hard to resist. There was not a man who did not feel a compulsion to turn back, to seek oblivion in the waters of *Rama*.

Norton called Hub urgently. "Can you see what's happening?"

The voice of Pieter came back to him, sounding awed and more than a little frightened.

"Yes, skipper. I'm looking across at the southern continent. There are still biots over there, including some big ones. Cranes, bulldozers—lots of scavengers. And they're all rushing back to the sea faster than I've ever seen them move before. There goes a crane—right over the edge! Just like Jimmy, but going down a lot quicker. It smashed to pieces when it hit. And here come the sharks. They're tearing into it—uh—it's not a pleasant sight.

"Now I'm looking at the plain. Here's a bulldozer that seems to have broken down—it's going around in circles. Now a couple of crabs are tearing into it, pulling it to pieces—skipper, I think you'd better get back right away."

"Believe me," Norton said with deep feeling, "we're coming just as quickly as we can."

RAMA was battening down the hatches like a ship preparing for a storm. That was Norton's overwhelming impression, though he could not have put it on a logical basis. He no longer felt completely rational. Two compulsions were warring in his mind—the need to escape and the desire to obey those

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bolts of lightning that still flashed across the sky, ordering him to join the biots in their march to the sea.

One more section of stairway—another ten-minute pause to let the fatigue poisons drain from his muscles. Then on again—another two kilometers to go . . .

The maddening sequence of descending whistles ceased. At the same moment, the fireballs racing along the slots of the Straight Valleys stopped their seaward strobing. *Rama*'s six linear suns were once more continuous bands of light.

But they were fading fast and sometimes they flickered, as if tremendous jolts of energy were being drained from waning power sources. From time to time slight tremors occurred underfoot. The bridge reported that *Rama* was still swinging with imperceptible slowness, like a compass needle responding to a weak magnetic field. This was perhaps reassuring—when *Rama* stopped its swing Norton would really begin to worry.

All the biots had gone, Pieter reported. In the whole interior of *Rama* the only movement was that of human beings, crawling with painful slowness up the curving face of the northern dome.

Norton had long since overcome the vertigo he had felt on that first ascent, but now a new fear was beginning to creep into his mind. He and his men were too vulnerable on this endless climb from plain to Hub. Suppose that, when it had completed its attitude change, *Rama* started to accelerate?

Presumably its thrust would be along the axis. If it came in the northward direction, that would be no problem—they would be held a little more firmly against the slope they were ascending. But if it were toward the south they might be swept off into space, to fall back eventually on the plain far below.

He tried to reassure himself with the thought that any possible acceleration would be very feeble. Dr. Perera's calculations had been most convincing—*Rama* could not possibly accelerate at more than a fiftieth of a gravity, or the Cylindrical Sea would climb the southern cliff and flood an entire continent. But Perera had been in a comfortable study back on Earth, not with kilometers of overhanging metal apparently about to crash down upon his head. And perhaps *Rama* had been designed for periodic flooding.

Norton tried to tell himself that he was being ridiculous. It was absurd to imagine that all these unwieldy tons could suddenly start moving with sufficient acceleration to shake him loose. Nevertheless, for the remainder of the ascent he never let himself get far from the handrail.

The stairway ended lifetimes later. Only a few hundred meters of vertical, recessed ladder were left. It was no longer necessary to climb this section since one man at the Hub, hauling on a cable, could easily hoist another against the rapidly diminishing gravity. Even at the bottom of the ladder a man weighed less than five kilos—at the top, practically zero.

SO NORTON relaxed in the sling, grasping a rung from time to time to counter the feeble Coriolis force still trying to push him off the ladder. He almost forgot his knotted

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muscles, as he had his last view of *Rama*.

The scene was about as bright now as Earth under a full moon. The overall view was clear, but one could no longer make out details. The South Pole was partially obscured by a glowing mist. Only the peak of Big Horn protruded through it—a small, black dot, seen exactly head-on.

The carefully mapped but still unknown continent beyond the sea was the same apparently random patchwork that it had always been. It was too foreshortened and too full of complex detail to reward visual examination and Norton scanned it only briefly.

He swept his eyes around the encircling band of the sea and noticed for the first time a regular pattern of disturbed water, as if waves were breaking over roofs set at geometrically precise intervals. *Rama's* maneuvering was having some effect, but he was sure that Sergeant Barnes would have sailed forth happily under these conditions, had he asked her to cross the sea in her lost *Resolution*.

New York, London, Paris, Moscow, Rome . . . He said farewell to all the cities of the northern continent, and hoped the Ramans would forgive him for any damage he had done. Perhaps they would understand that it had been in the cause of science—or at least learning.

Suddenly he was at the Hub and eager hands reached out to grab him and hurry him through the airlocks. His overstrained legs and arms were trembling so uncontrollably that he was almost unable to help himself and was content to be handled like a semi-paralyzed invalid.

The sky of *Rama* contracted above him as he descended into the central crater of the Hub. As the door of the inner airlock shut off the view forever he found himself thinking: *How strange that night should be falling—now that* Rama *is closest to the sun!*

XXIX

A HUNDRED kilometers was an adequate safety margin, Norton had decided. *Rama* was now a huge black rectangle, exactly at broadside, eclipsing the sun. He had used this opportunity to fly *Endeavor* completely into shadow, so that the load could be taken off the ship's cooling systems and some overdue maintenance could be carried out. *Rama*'s protective cone of darkness might disappear at any moment and he intended to make as much use of it as he could.

Rama was still turning. It had now swung through almost fifteen degrees and it was impossible to believe that some major orbit change was not imminent. On the United Planets excitement had now reached a pitch of hysteria, but only a faint echo of this came to *Endeavor*. Physically and emotionally her crew was exhausted. Apart from a skeleton watch everyone had slept for twelve hours after take-off from the North Polar Base. On doctor's orders, Norton himself had used electro-sedation. Even so he had dreamed that he was climbing an infinite stairway.

The second day back on ship, everything had almost returned to normal. The exploration of *Rama* already seemed part of another life. Norton started to deal with accumulated office work and to make plans

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for the future, but he refused the requests for interviews that had somehow managed to insinuate themselves into the Survey and even Spaceguard radio circuits. There were no messages from Mercury and the United Planets General Assembly had adjourned its session, though it was ready to meet again at an hour's notice.

Norton was having his first good night's sleep, thirty hours after leaving *Rama,* when he was rudely shaken back to consciousness. He cursed groggily, opened a bleary eye at Karl Mercer and then, like any good commander, was instantly awake.

"It's stopped turning?"

"Yes. Steady as a rock."

"Let's go to the bridge."

The whole ship was awake. Even the simps knew that something was afoot and made anxious, meeping noises until Sergeant McAndrews reassured them with swift hand signals. Yet as Norton slipped into his chair and fastened the restraints around his waist, he wondered if this might be yet another false alarm.

Rama was now foreshortened into a stubby cylinder and the searing rim of the sun had peeked over one edge. Norton jockeyed *Endeavor* gently back into the umbra of the artificial eclipse and saw the pearly splendor of the corona reappear across a background of the brighter stars. There was one huge prominence, at least half a million kilometers high, that had climbed so far from the sun that its upper branches looked like a tree of crimson fire.

So now we have to wait, Norton told himself. *The important thing is not to get bored, to be ready to react at a moment's notice, to keep all the instruments aligned and recording, no matter how long it takes . . .*

That was strange. The star field was shifting, almost as if he had actuated the roll thrusters. But he had touched no controls and if there had been any real movement, he would have sensed it at once.

"Skipper," said Calvert urgently from the navigator's position, "we're rolling—look at the stars. But I'm getting no instrument readings."

"Rate gyros operating?"

"Perfectly normal—I can see the zero jitter. But we're rolling several degrees a second."

"That's impossible."

"Of course it is. But look for yourself—"

When all else failed, a man had to rely on eyeball instrumentation. Norton could not doubt that the star field was indeed slowly rotating—there went Sirius, across the rim of the port. Either the universe, in a reversion to pre-Copernican cosmology, had suddenly decided to revolve around *Endeavor*—or the stars were standing still and the ship was turning.

The second explanation seemed rather more likely, yet it involved apparently insoluble paradoxes. If the ship were really turning at this rate he would have felt it, literally, in the seat of his pants, as the old saying went. And the gyros could not all have failed simultaneously and independently.

Only one answer remained. Every atom of *Endeavor* must be in the grip of some force—and only a powerful gravitational field could produce this effect. At least, no other *known* field.

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SUDDENLY the stars vanished. The blazing sun had emerged from behind the shield of *Rama* and its glare had driven them from the sky.

"Can you get a radar reading? What's the doppler?"

Norton was fully prepared to find that this, too, was inoperative, but he was wrong.

Rama was underway at last, accelerating the modest rate of 0.015 gravities. Dr. Perera, Norton told himself, would be pleased—he had predicted a maximum of 0.02. And *Endeavor* was somehow caught in its wake like a piece of flotsam, whirling around and around behind a speeding ship.

Hour after hour that acceleration held constant. *Rama* was falling away from *Endeavor* at a steadily increasing speed. As its distance grew the anomalous behavior of the ship slowly ceased and normal laws of inertia started to operate again. The crew could only guess at the energies in whose backlash the ship had been briefly caught and Norton was thankful that he had stationed *Endeavor* at a safe distance before *Rama* had switched on its drive.

As to the nature of that drive, one thing was now clear, though all else was mystery. No jets of gas, no beams of ions or plasma were thrusting *Rama* into its new orbit. No one put it better than Sergeant-Professor Myron when he said in shocked disbelief, "There goes Newton's Third Law."

It was Newton's Third Law, however, upon which *Endeavor* had to depend the next day, when she used her very last reserves of propellant to bend her own orbit outward from the sun. The change was slight, but it would increase her perihelion distance by ten million kilometers. That was the difference between running the ship's cooling system at 95 per cent capacity and a fiery death.

When *Endeavor* had completed its maneuver *Rama* was two hundred thousand kilometers away and difficult to see against the glare of the sun. But the humans could still obtain accurate radar measurements of its orbit and the more they observed, the more puzzled they became.

They checked the figures over and over again, until there was no escaping the unbelievable conclusion. It looked as if all the fears of the Hermians, the heroics of Rodrigo and the rhetoric of the General Assembly, had been utterly in vain.

What a cosmic irony, said Norton as he looked at his final figure, if after a million years of safe guidance *Rama*'s computers had made one trifling error—perhaps changing the sign of an equation from plus to minus.

Men who had sought to destroy it had been so certain that *Rama* would lose speed in order to be captured by the sun's gravity and thus become a new planet of the solar system. It was doing just the opposite.

It was gaining speed—and in the worst possible direction.

Rama was falling ever more swiftly into the sun.

AS THE details of its new orbit became more and more clearly defined it was hard to see how *Rama* could possibly escape disaster. Only a handful of comets had ever passed as close to the sun—at perihelion it would be less than half a million

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kilometers above that inferno of fusing hydrogen. No solid material could withstand the temperature of such an approach. The tough alloy that made up *Rama*'s hull would start to melt at ten times that distance.

Endeavor had now passed its own perihelion—to everyone's relief—and was slowly increasing its distance from the sun. *Rama* was far ahead on its closer, swifter orbit and already appeared well inside the outermost fringes of the corona. The ship would have a grandstand view of the drama's final stage.

Then, five million kilometers from the sun, and still accelerating, *Rama* started to spin its cocoon. Until now it had been visible under the maximum power of *Endeavor's* telescopes as a tiny bright bar; suddenly it began to scintillate, like a star seen through horizon mists. It almost seemed to be disintegrating. When he saw the image breaking up, Norton felt a poignant sense of grief at the loss of so much wonder. Then he realized that *Rama* was still there, but that it was surrounded by a shimmering haze.

And then it was gone. In its place was a brilliant, starlike object—as if *Rama* had suddenly contracted into a tiny ball.

It was some time before they realized what had happened. *Rama* had indeed disappeared. It was now surrounded by a perfectly reflecting sphere about a hundred kilometers in diameter. All they could now see was the reflection of the sun itself, on the curved portion that was closest to them. Behind this protective bubble *Rama* was presumably safe from the solar inferno.

As the hours passed, the bubble changed its shape. The image of the sun became elongated, distorted. The sphere was turning into an ellipsoid, its long axis pointed in the direction of *Rama*'s flight. It was then that the first anomalous reports started coming in from the robot observatories, which for almost two hundred years had been keeping a permanent watch on the sun.

Something was happening to the solar magnetic field in the region around *Rama*. The million-kilometer-long lines of force that threaded the corona and drove its wisps of fiercely ionized gas at speeds that sometimes defied even the crushing gravity of the sun, were shaping themselves around that glittering ellipsoid. Nothing was yet visible to the eye, but the orbiting instruments reported every change in magnetic flux and ultraviolet radiation.

And presently even the eye could see the changes in the corona. A faintly glowing tube or tunnel, a hundred thousand kilometers long, had appeared high in the outer atmosphere of the sun. It was slightly curved, bending along the orbit *Rama* was tracing and *Rama* itself—or the protective cocoon around it—was visible as a glittering bead racing faster and faster down that ghostly tube through the corona.

For it was still gaining speed. Now it was moving at more than two thousand kilometers a second, and there was no question of its ever remaining a captive of the sun. Now, at last, *Rama*'s strategy was obvious. It had come so close to the sun merely to tap its energy at the source and to speed itself even faster

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on the way to its ultimate, unknown goal.

And presently it seemed that *Rama* was tapping more than the sun's energy. No one could ever be sure of this, because the nearest observing instruments were thirty million kilometers away, but there were definite indications that matter was flowing from the sun into *Rama* itself, as if replacing the leakage and losses of ten thousand centuries in space.

Faster and faster *Rama* swept around the sun, moving now more swiftly than any object that had ever traveled through the solar system. In less than two hours its direction of motion had swung through more than ninety degrees and it had given a final, almost contemptuous proof of its total lack of interest in all the worlds whose peace of mind it had so rudely disturbed.

It was dropping out of the ecliptic, down into the southern sky, far below the plane in which all the planets move. Though that, surely, could not be its ultimate goal, it was aimed squarely at the Greater Magellanic Cloud and the lonely gulfs beyond the Milky Way.

XXX

"COME in," said Commander Norton absent-mindedly at the quiet knock on his door.

"Some news for you, Bill. I wanted to give it first, before the crew gets into the act. And anyway, it's my department."

Norton still seemed far away. He was lying on his bunk, his hands clasped under his head, eyes half shut, cabin light low—not really drowsing, but lost in some reverie or private dream.

He blinked once or twice and was suddenly back in his body.

"Sorry Laura—I don't understand. What's the news about?"

"Don't say you've forgotten."

"Stop teasing, you wretched woman. I've had a few things on my mind recently."

Surgeon-Commander Ernst slid a captive chair across in its slots and sat down beside him.

"Though interplanetary crises come and go, the wheels of Martian bureaucracy grind steadily away. But I suppose *Rama* helped. Good thing you didn't have to get permission from the Hermians as well."

Light was dawning.

"Oh—Port Lowell has issued the permit?"

"Better than that—it's already being acted on." Laura glanced at the slip of paper in her hand. "Immediate," she read. "Probably right now, your new son is being conceived. Congratulations."

"Thank you. I hope he hasn't minded the wait."

Like every astronaut, Norton had been sterilized when he entered the service. For a man who would spend years in space, radiation-induced mutation was not a risk—it was a certainty. The spermatozoon that had just delivered its cargo of genes on Mars, two hundred million kilometers away, had been frozen for thirty years, awaiting its moment of destiny.

Norton wondered if he would be home in time for the birth. He had earned rest, relaxation—such normal family life as an astronaut could ever

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know. Now that the mission was essentially over, he was beginning to unwind and to think once more about his own future and that of both his families. Yes, it would be good to relax for a while and to make up for lost time—in many ways.

He had some lost time to make up right here. He told Laura so and, reaching for her, began to act upon it.

"This visit," protested Laura rather feebly, "was purely in a professional capacity."

"After all these years," replied Norton, "we know each other better than that. Anyway, you're off duty now." This situation, he knew, was doubtless being repeated throughout the ship. Even though they were weeks from home, the end-of-mission "Orbital Orgy" would be in full swing.

"Now what are you thinking?" demanded Surgeon-Commander Ernst, very much later. "You're not becoming sentimental, I hope."

"Not about us. About *Rama.* I'm beginning to miss it."

"Thanks very much for the compliment."

Norton tightened his arms around her. One of the nicest things about weightlessness, he often thought, was that you could really hold someone all night without cutting off the circulation. There were those who claimed that love at one gee was so ponderous that they could no longer enjoy it.

"It's a well-known fact, Laura, that men, unlike women, have two-track minds. But seriously—well, more seriously—I do feel a sense of loss."

"I can understand that."

"Don't be so clinical. Oh, hell, never mind." He gave up. What he felt was not easy to explain even to himself.

He had succeeded beyond all reasonable expectations. What his men had discovered in *Rama* would keep scientists busy for decades.

But he had also failed. One might speculate endlessly, but the nature and the purpose of the Ramans was still utterly unknown. They had used the solar system as a refueling stop, a booster station—call it what you will—and had then spurned it completely, on their way to more important business. They would probably never even know that the human race existed. Such monumental indifference was worse than any deliberate insult.

When Norton had glimpsed *Rama* for the last time, a tiny star hurtling outward beyond Venus, he knew that part of his life was over. He was only fifty-five, but he felt he had left his youth down there on the curving plain, among mysteries and wonders now receding inexorably beyond the reach of man. Whatever honors and achievements the future brought him, for the rest of his life he would be haunted by a sense of anticlimax and the knowledge of opportunities missed.

So he told himself—but even then, he should have known better.

And on far-off Earth, Dr. Carlisle Perera had as yet told no one how he had woken from a restless sleep with the message from his subconscious still echoing in his brain:

The Ramans do everything in threes.

★

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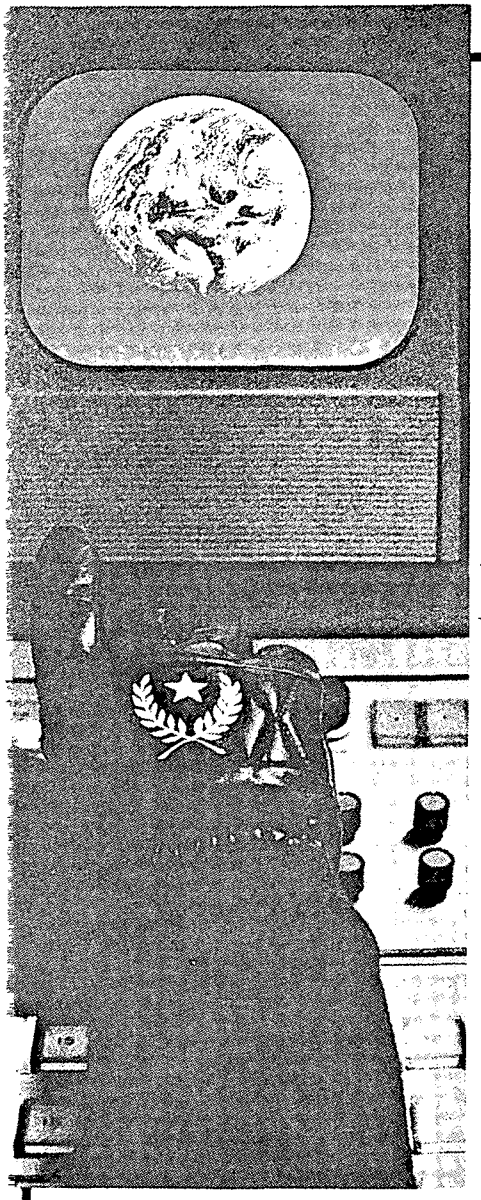

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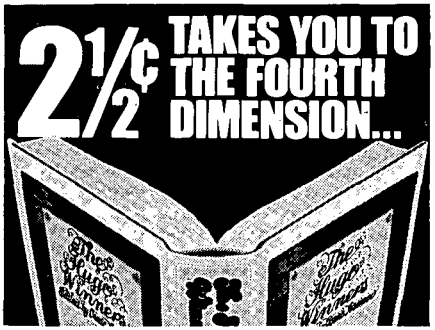

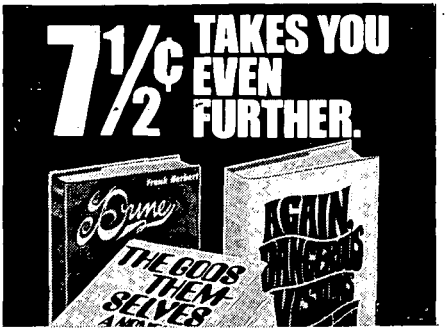

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